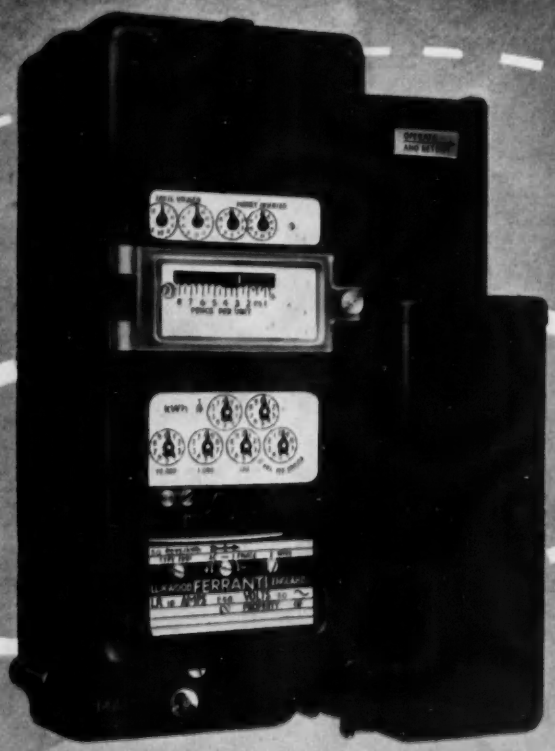
6 OCTOBER 1955 ONE SHILLING

ELECTRICAL TIMES



FERRANTI
FMP

PREPAYMENT METER

The Ferranti FMP Prepayment Meter has a strong appeal to the Supply Engineer. The meter is built to meet modern requirements.
It is robust in construction, using essential material liberally and having operating characteristics of the highest order.
Ferranti also manufacture the FMP2 meter with Fixed Charge Collector Mechanism.

FERRANTI LTD · HOLLINWOOD · LANCS
London Office: KERN HOUSE, 36 KINGSWAY, W.C.2

F
FERRANTI

Supplying the needs of the Electrical Industry ✻

COOPERS FELT

Felt Polishing Bobs

Felt for machinery installation

Felt washers, gaskets, strips, channels, rings

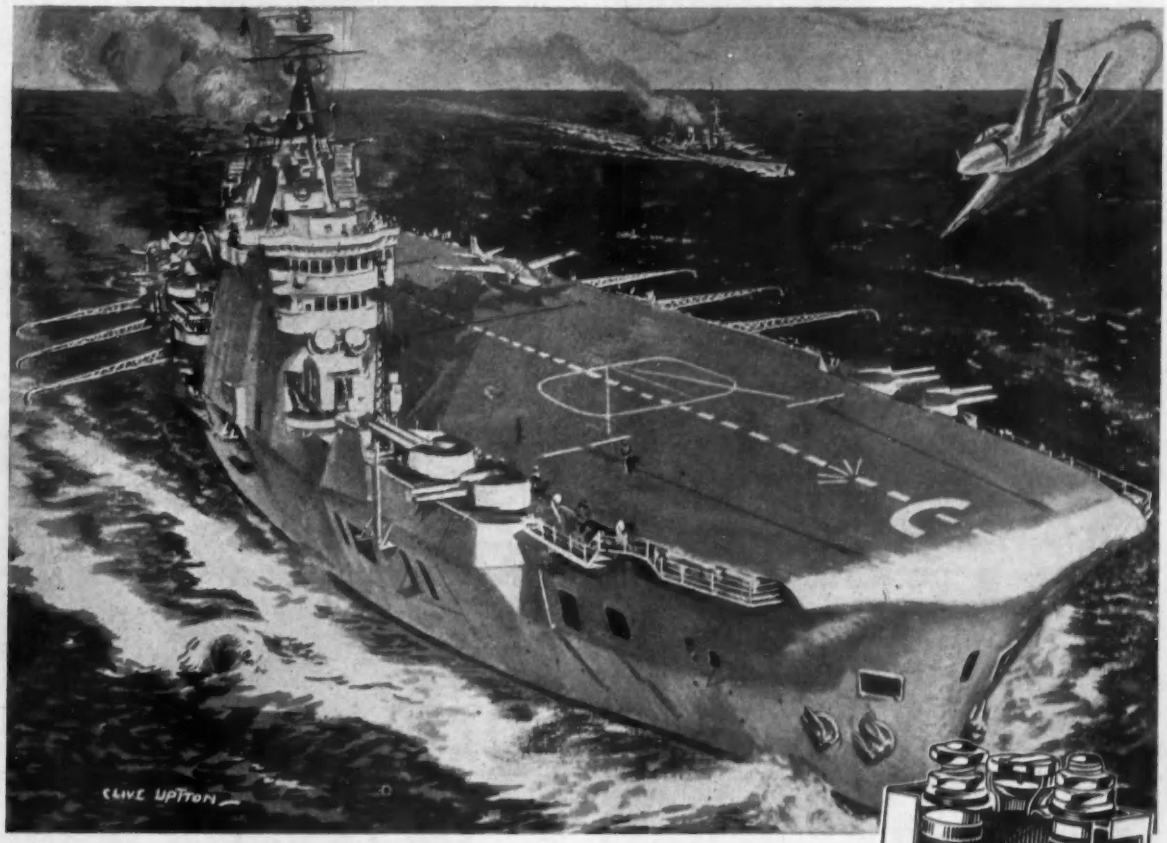
Felt soft as cotton wool or hard as wood

Coopers Felt serves the industry in many ways

Coopers will be happy to send you free literature

COOPER & CO. (B'ham) LTD., BRYNMAWR, BRECONSHIRE. **Tel: Brynmawr 312**

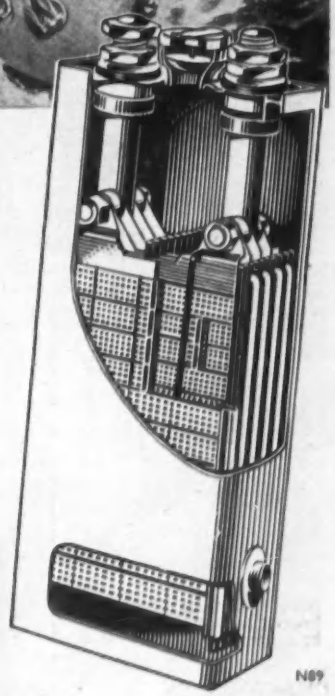
Which battery is built like H.M.S. Eagle?



It's a Nife!—it too is made of steel. And like H.M.S. Eagle a Nife battery is built to stand up to the toughest use—to withstand shock and vibration and to operate efficiently under the severest mechanical conditions. But unlike this giant aircraft carrier a Nife battery is light and compact, takes up very little space and requires virtually no maintenance. A Nife battery withstands the heaviest discharge, is free from self-discharge and is unaffected by idleness in any state of charge. *It repays its original cost many times over!*

These are the reasons why so many electrical engineers rely on Nife Batteries for:

SWITCH CLOSING · SWITCH TRIPPING · EMERGENCY LIGHTING
STANDBY POWER FOR AUXILIARIES AND CONTROL CIRCUITS
SEARCHLIGHT AND INSPECTION SETS · DIESEL ENGINE STARTING
PORTABLE SAFETY LAMPS · TELECOMMUNICATIONS
BATTERY ELECTRIC TRUCKS AND LOCOS



Its name is NIFE

THE **STEEL** ALKALINE BATTERY

N89

Nife Batteries · Redditch · Worcestershire

A

CRATER

PHONE
WOKING 2706

ROTARY SPECIALISTS

"C SERIES"
Rotary
15/30 amps. 220/440 V, AC.
Up to 8 positions

OTHER ROTARY TYPES
MF Series 5 amps. 250 V, AC.
Up to 12 positions
R.10 Series 10 amps.
250 V, AC./DC.
Up to 8 positions
Hermetically Sealed
Key Operated

Single and Multi-way
Push Button Switches
Appliance Switches

TYPE
APPROVED

SWITCHES

CRATER PRODUCTS LTD • LYE WORKS • WOKING • SURREY

Dunlow
think of
everything
in Electric
Fluid
Heating

FLP

Flame - proof Immersion Heater, tubular type, screwed 1½" or 2" BSPT, ·5 kW to 3·5 kW.

Electric Storage Tank in heavy gauge copper protected by outer steel casing.

'Dunlow' Electric Liquid Heating equipment and materials have over the past 25 years proved their efficiency and reliability. Pioneers in Electric Water Heating, Duncan Low Ltd. now supply a comprehensive range of Water, Oil and Acid Electric Heating equipment meeting the varied needs of Domestic, Agricultural and Industrial users.

They are pleased to offer their co-operation in the design of equipment to suit special and individual requirements.

DUNCAN LOW LTD • 293 Bell Street, Glasgow, C.4
Phone: Bell 1961 • Grams: Immerser, Glasgow

MARTINDALE

VOLTAGE TESTER
MODEL 54

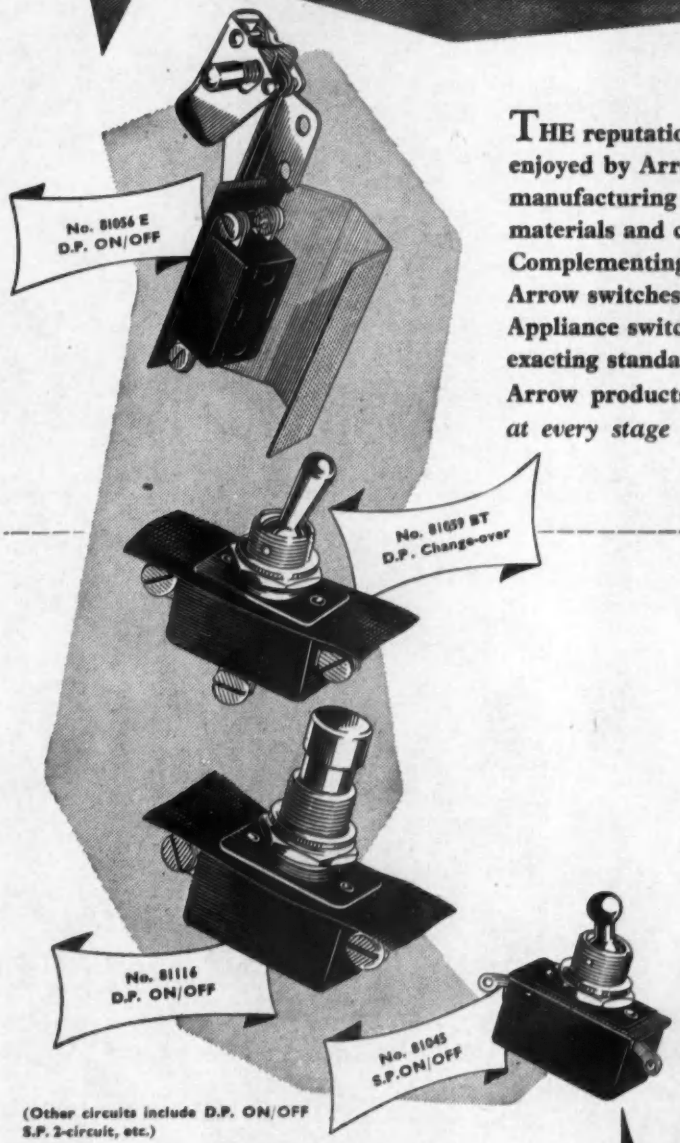
tells you instantly

OVER 250,000 IN USE
Light yet sturdily built for constant duty and long life. Easily carried in the pocket. NO glass to break. NO gas to leak.
FULLY PROTECTED AND FUSED.

Is it alive ?
What voltage (up to 600) ?
A.C. or D.C. ?
Which is earth ?
and with absolute safety even on heavily fused conductors.

MARTINDALE ELECTRIC CO. LTD.
45 WESTMORLAND ROAD, LONDON, N.W.9
also at 25 ELMBANK STREET, GLASGOW, C.2.

AN ENTIRELY NEW RANGE OF "INTERMEDIATE" INSTRUMENT AND APPLIANCE SWITCHES



(Other circuits include D.P. ON/OFF S.P. 2-circuit, etc.)

THE reputation for reliability and efficiency enjoyed by Arrow products stems from a realistic manufacturing policy supported by first-quality materials and craftsmanship.
Complementing the already extensive range of Arrow switches, these new Instrument and Appliance switches are manufactured to the same exacting standards — and like all Arrow products are *individually inspected at every stage of production.*

These switches are all available with solder lugs and binding screw terminals and either type of lever illustrated. They have quick make-and-break mechanisms and carry 3 amp. 250 volt ratings.

Their main characteristic is the maintenance of low contact resistance after considerable life, and are therefore ideal for instrument and electronic work.

The same switches, when fitted with either spring-loaded trigger levers or double-acting mechanisms, are particularly suitable for portable tools or foot-operated appliances when enclosed switches are preferred and approval in export markets a necessity.

SEND TODAY FOR FULL DETAILS

ARROW

ARROW ELECTRIC SWITCHES LTD · HANGER LANE · LONDON · W.5

AR.14

There's more to Thermal Storage than buying a few heaters...

Qualified Thermodare Technicians will provide you with a complete heating scheme – with plans

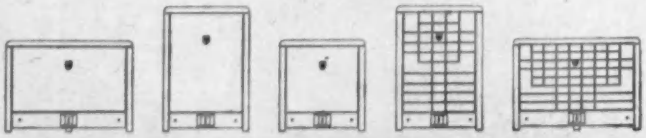
THERMODARE (GREAT BRITAIN)
79/80 PETTY FRANCE · LONDON · S.W.1

Telephone: ABBey 1060/3348

Thermodare advisory service is at your disposal

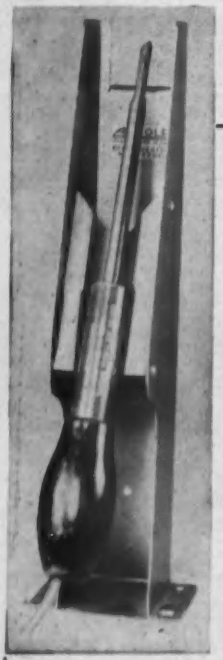
Although the principles of Thermal Storage are known to most engineers, some guidance on its installation is often helpful. We at Thermodare specialize in this method of heating and will supply complete heating schemes with working drawings whenever required. It is beneficial to all concerned if we can be called in at an early stage. A preliminary discussion without obligation will often save time and expense later.

A range of five models



THERMODARE

THE ONLY SPECIALISTS IN THERMAL STORAGE UNIT HEATING



SOLDERING EQUIPMENT

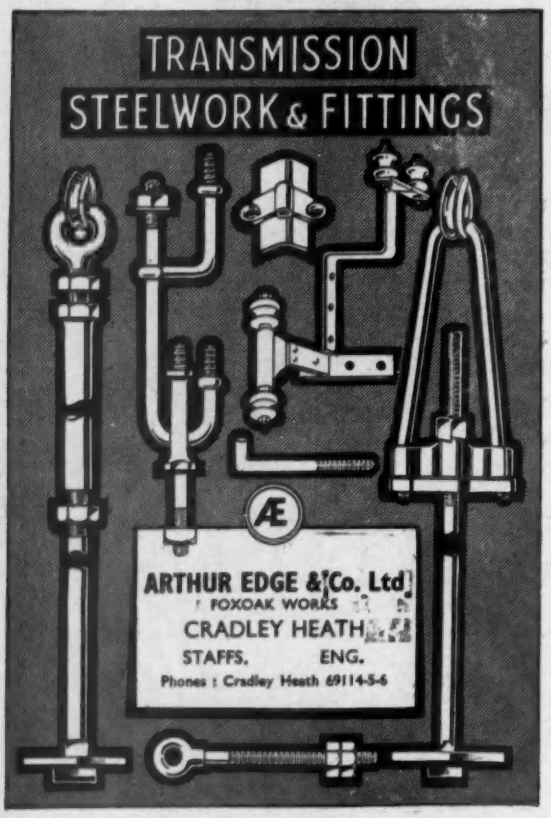
ADCOLA
(Regd. Trade Mark)

Illustrated
SHIELD · List No. 68
MODEL · List No. 64

Write for catalogues

ADCOLA PRODUCTS LTD
Gauden Road · London · S.W.4
Tel.: Macaulay 4272

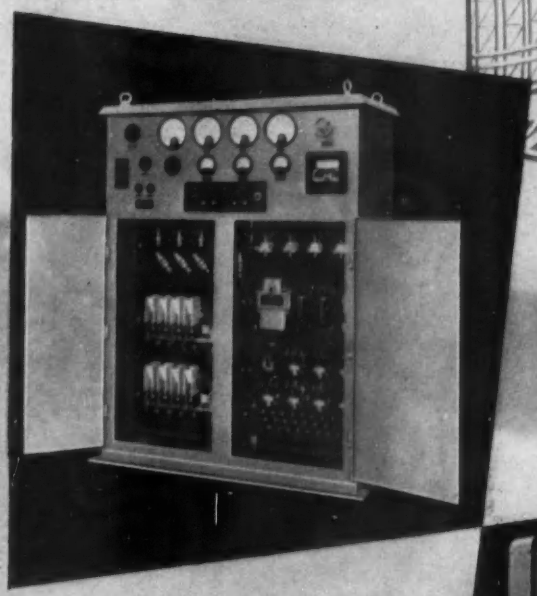
TRANSMISSION
STEELWORK & FITTINGS



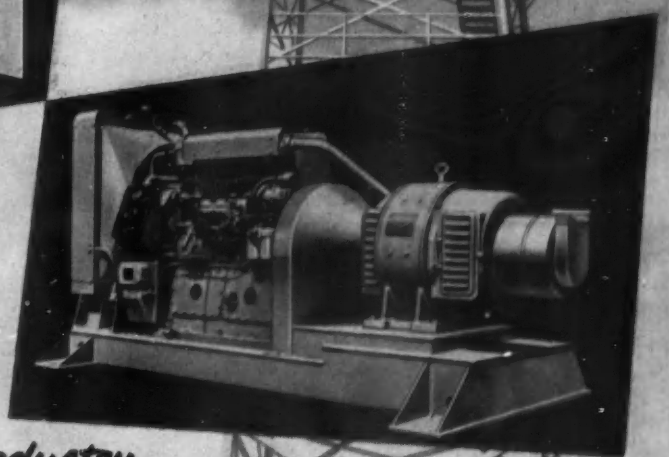
ARTHUR EDGE & Co. Ltd.
FOXOAK WORKS
CRADLEY HEATH
STAFFS. ENG.
Phones: Cradley Heath 69114-5-6

fully automatic stand-by

Radio and Radar installations, sick bays, control rooms — Electro Dynamic Fully Automatic mains failure sets are fitted with a wide variety of special features to suit the diversity of demand. One of these optional features is the monitoring of mains voltage with an adjustable delay of, usually, 0·5 to 5 seconds. Easily transportable, a thoroughly reliable diesel engine supports experienced skill of control design.



A Control Panel
50 kVA, 400 volts,
3-phase, 60 cycles



A typical 50 kVA
Fully Automatic Stand-by Diesel
Alternator Set.

Energy shaped to industry

ELECTRO DYNAMIC CONSTRUCTION CO LTD

ST. MARY CRAY · KENT

Tel: ORPINGTON 27551. Grams: "ELEDAMIC, ST. MARY CRAY"

Control Gear Works: Bridgwater, Somerset. Tel: Bridgwater 2882. Glasgow Office: 40 Houldsworth St., C.3. Tel: Central 2620

1912-1955

The story of BELLING & COMPANY LIMITED

No. 28. OCTOBER, 1955.

THIS is my usual half-yearly report and although there has been a slight recession in cooker sales, due to restrictions on hire purchase, and also reduced quotas on export goods, I have cheerful news to tell you.

Irrespective of these troubles we have pushed our sales up for these six months, to 30% above the same six months of last year and, in addition, we have completed more buildings here and have them at work (Now about 350,000 sq. ft.).

This factory is beginning to look good as you will agree when you scan the picture above but, unfortunately, it is now practically completely built over and we are stuck for space.

The good news is that this is only temporary. We have bought and paid for our new 10-acre site at Burnley; the space for the first building (440′×220′) is levelled, foundations for all stanchions are in place, the steel erection is well forward and we hope to have much of this additional 100,000 sq. ft. of space *at work* before Christmas. Then we have room for three other similar buildings, so do not hesitate to send your orders in! Incidentally, we shall be wanting several senior staff people for Burnley at appropriate salaries. Anyone interested should write me personally.

Our new catalogue, we hope, will help you to get some of these orders. You can have as many *large* catalogues as you like for distribution amongst suitable people. Don't be stingy with them. We reckon every catalogue sells something of our make and soon recovers the odd 1s. it has cost us.

This is our first effort in full colour, which we hope to improve each year. It's not so bad even now and we don't mind how many we print.

Our new Convector (Page 32/33) is most attractive. It looks fine—it works fine. Of course, we are far behind in production—as usual.

Cookers are all going well and giving very little trouble. Our 53 is marvellous and we can give immediate delivery. Drying Cabinets and Food Warming Cabinets have also both been moving up in sales lately.

The Radiant Convector (Page 35) is also a grand seller —irrespective of its price. The fact is it is so very practical and useful—warms the room, warms your toes and dries your clothes—as they say. We've got another saying too—"Every dwelling needs a Belling"—of some sort or other!

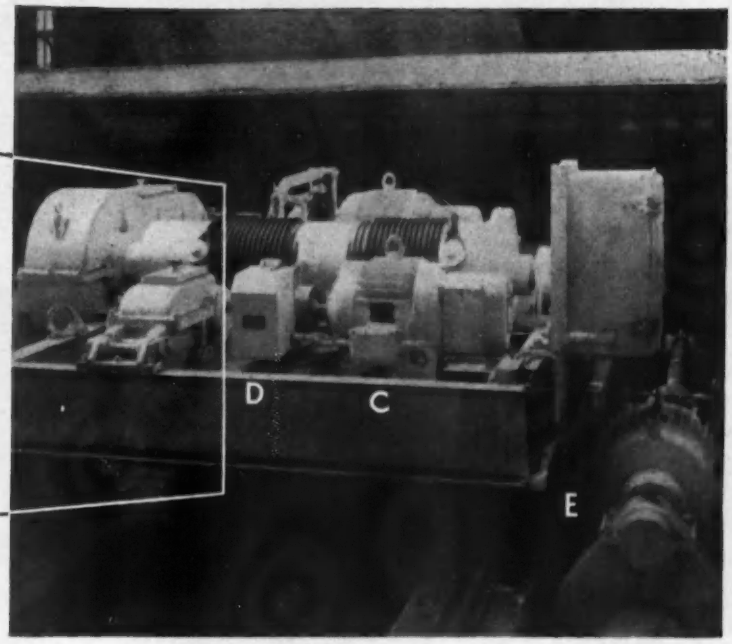
Well that clears up our catalogue. I've cleared up our Works side, we seem to be financing Burnley in our ordinary stride; marvellous where it comes from (not at 5% either), and your part of this business for the moment consists in sending us your orders. May be your opportunity to hold a few shares will come presently.

Of course, I have been talking about this for years, but so I have about the little house at Sandbanks. Anyway this latter has come to fruition (more anon), so don't give up hope about the other. Am afraid I have used my bit of space, but hope to be writing you again next April.

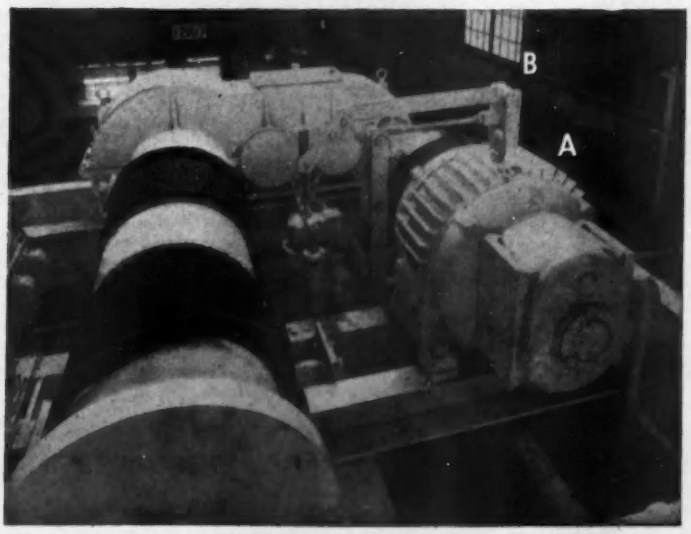
C. A. Belling

Belling & Company Limited · Bridge Works · Enfield · Middlesex

ON TOP OF THE JOB



Metrovick equipment is well on top in this 10-ton Wharton overhead shop crane. The hoist is an 18-h.p. 720 r.p.m. M-V motor fitted with a thrustor-operated brake giving precise control with stable creeping speed on load. The need for inching is thus eliminated. Drives for the long travel and cross-traverse are M-V 10-h.p. 715 r.p.m. and 3-h.p. 700 r.p.m. type MZ slipring motors respectively. A 6-inch Perigrip brake operates on the cross traverse. Write for details of the range of M-V a.c. and d.c. motors, control gear and Perigrip electromagnetic brakes for crane drives.



In the illustration (left) A is the 18-h.p. 720 r.p.m. hoist motor fitted with Stacreep thrustor control B. The long-travel drive, motor E, is shown at the top of page. The 3 h.p. cross traverse motor is seen at C and the 6-inch Perigrip brake at D.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

Member of the A.E.I. group of companies

I/C.191

Agriculture and the Balance of Power

BRITISH FARMERS ARE PRODUCING MORE FOOD—more efficiently. They are using less labour—more productively. They are using *more electricity.*

Electricity pumps water, hoists loads, dries crops, helps to light the cowsheds, milk the cows and keep the milk cool and fresh. Electricity is the perfect farm worker, available at any time of the day or night.

The farmer's wife, too, is using more electricity, to give her comforts and convenience never before available in the country. All this is very fine for the farmer and his wife. But how about the other consumers who want electricity? It's a very good thing for them too. Why?

It's a matter of balance. Different jobs need electricity at different times of the day and night. These varied demands help to even out the load on the power stations. When generating plant is continuously operated the price of electricity is kept low. All users benefit, therefore, the more widely electricity is used, for more and more purposes.

7 YEARS' PROGRESS

47 NEW POWER STATIONS

10,000,000 ADDITIONAL HORSEPOWER INSTALLED

A G.E.C. LIGHTING INSTALLATION IS ALWAYS DISTINCTIVE

Subtly blending artistry with technology, the science of lighting as it is practised by G.E.C. designers and engineers is creating exciting new concepts of beauty and efficiency in illumination. The G.E.C. lighting service is available anywhere in the world through every G.E.C. Branch establishment.

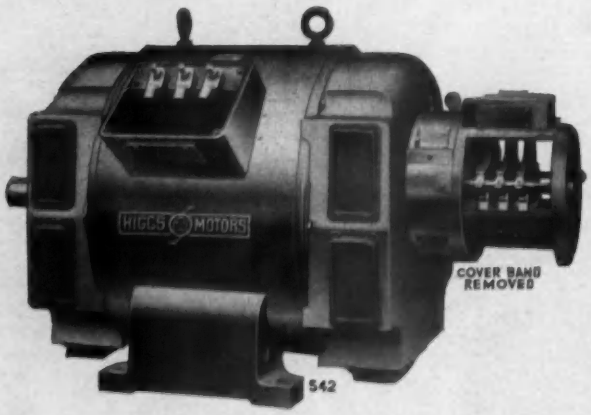
THE GENERAL ELECTRIC CO LTD · MAGNET HOUSE · KINGSWAY · LONDON · W.C.2

TRADE MARK

HIGGS MOTORS LTD.

MANAGING DIRECTOR DAVID C.Y. HIGGS, A.M.I.E.E.

BIRMINGHAM 6 ENGLAND



Any size from ½ to 1,000 H.P.

GUARANTEED FOR EVER

Belfast · Bristol · Cardiff · Dundee · Glasgow · Hull · Leeds · Liverpool
London · Manchester · Newcastle · Peterborough · Sheffield · Wolverhampton

For good all-round wiring

CP ELECTRICAL EQUIPMENT

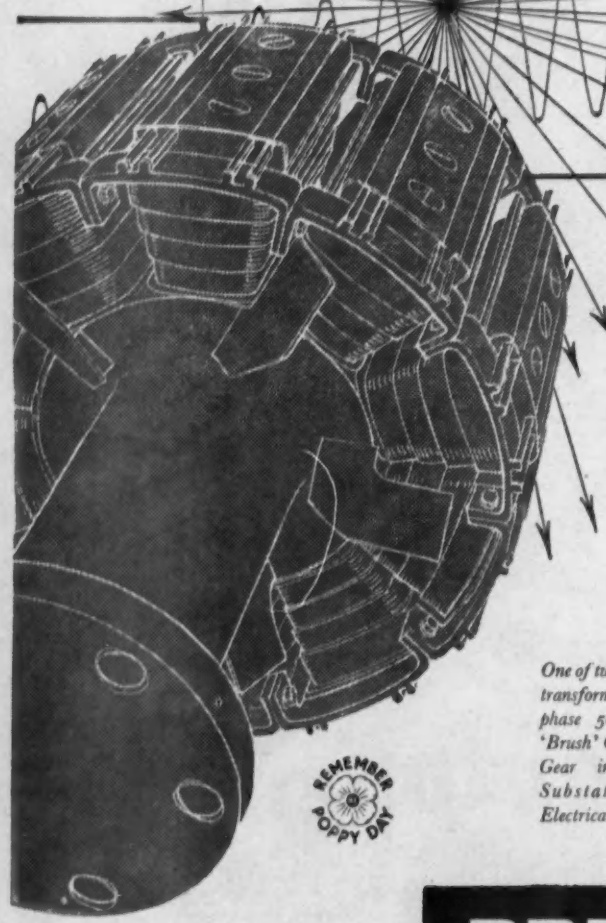
Crompton

THERMOPLASTIC INSULATED CABLES

CROMPTON PARKINSON LTD · CROMPTON HOUSE · ALDWYCH · LONDON W.C.2 · TELEPHONE CHANCERY 3333

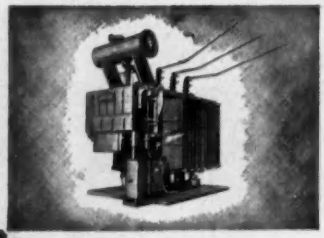
THE POWER BEHIND BRUSH . . .

TESTING



From laboratory prototype to production unit all Brush manufactured equipment is subjected to a rigorous testing process. It is this strict system of tests and controls at all stages that results in the outstanding performance of Brush units under the toughest operating conditions all over the world. Today, the up-to-date production facilities and skilled engineers of the Brush Electrical organisation are joined to a vigorous development policy and a thorough grasp of world requirements. That is why Power Engineers all over the world increasingly look to Brush to provide them with the reliable job-tested type of Power Equipment they need.

One of two 'Brush' 10,000 kVA transformers 33/11.5 kV, 3 phase 50 cycles, fitted with 'Brush' On Load Tap Changing Gear installed at Lawford Substation of the Central Electrical Authority.



Whatever your power problem . . . consult

BRUSH

TRANSFORMERS · SWITCHGEAR · MOTORS
ALTERNATORS · GENERATORS · TURBINES

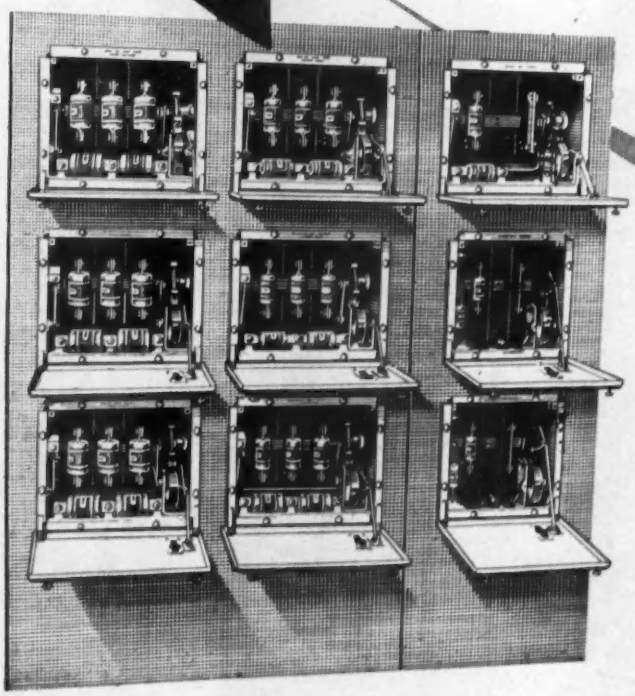
BRUSH ELECTRICAL ENGINEERING CO. LTD., *Loughborough, England* · *Member of the Brush Group* BRUSH

REMEMBER POPPY DAY

SWITCH

TO BRUSH H.R.C. FUSE LINKS

All over the world you will find Brush H.R.C. Cartridge fuses safeguarding valuable electrical plant. Their widespread and growing popularity can be explained in just two words. Dependable quality. This is why so many leading manufacturers incorporate H.R.C. Brush links in their Switchgear. The Brush H.R.C. fuse link range covers current ratings from 2 to 300 amperes and conforms to British Standard dimensions. Write today for Publication No. 81002.



You get **exactly** what you want from

BRUSH

BRUSH ELECTRICAL ENGINEERING CO. LTD.
HOPKINSON WORKS, CARDIFF · MEMBER OF THE BRUSH GROUP

INDUSTRIAL PLATES FOR EVERY PURPOSE!

We are not wizards but nearly a century of experience in the manufacture of engraved plates of all kinds for all purposes and in all languages, ensures craftsmanship of which we are justly proud.

Our products-in plastics, engraved ivorine, enamelled bronze, cast aluminium, brass, etc., are supplied to all the leading industrial and shipbuilding companies in the country and we are on the Admiralty List.

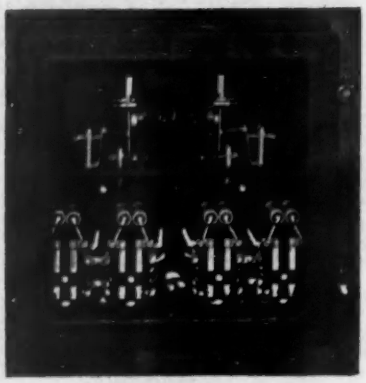
Designs will be submitted on request for reproduction in large or small quantities.
Let us know your requirements which will receive instant attention.

EDWARD H. THEW LTD.
The Empire's Largest General Engravers
[12] FIRST AVENUE,
TEAM VALLEY TRADING ESTATE
GATESHEAD-ON-TYNE 11
Telephone: LOWFELL 75667 Grams: "Engraving Gateshead-on-Tyne"

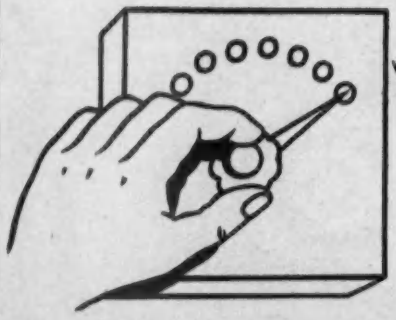
3649

COXOHM AUTOMATIC VOLTAGE REGULATOR

- Suitable for large A.C. or D.C. machines.
- Possesses extreme sensitivity.
- Accurate to within ± 1%.
- Full balancing gives stability under mobile conditions.
- Simple to install and to put into operation.
- Maintenance negligible.



As specialists in the field we shall be pleased to advise on the question of automatic voltage regulation if we may receive particulars of your specific requirements for any loading.



COX WALKERS LTD.
NORTH EASTERN ELECTRIC WORKS
Established 1880 **DARLINGTON** *Phone 2387*

MOULDED RUBBERS

Always just right

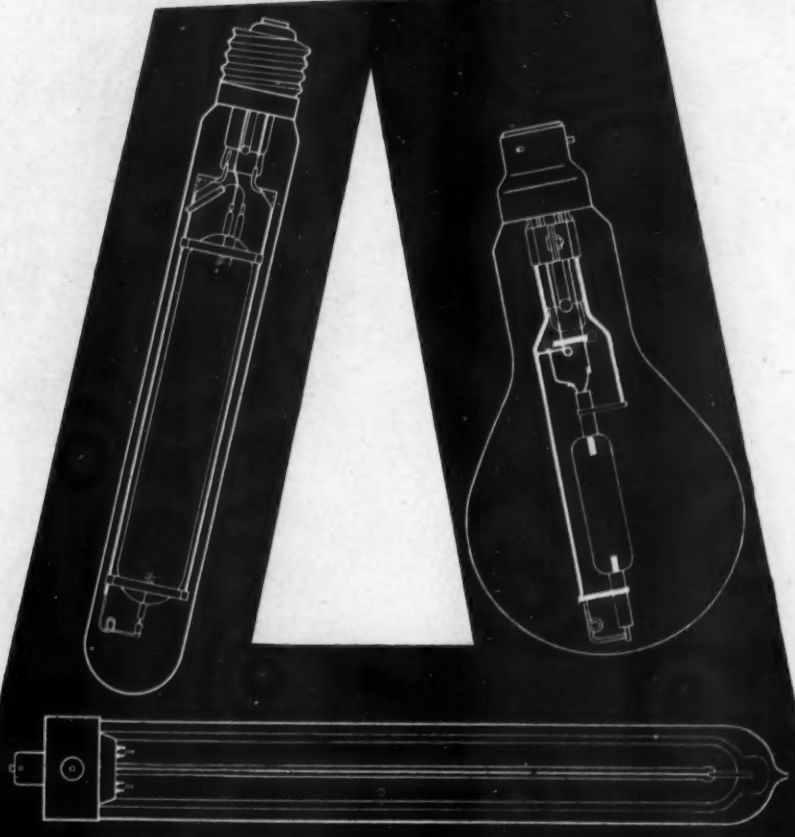
Dainite

THE HARBORO' RUBBER CO. LTD., Market Harborough. Tel: 22765

CURRENT ECONOMY HIGH LUMEN EFFICIENCY

4000 BURNING HOURS WITH **ATLAS SODIUM VAPOUR LAMPS**

AND **MERCURY VAPOUR LAMPS**



ATLAS produce and sell all popular types of Sodium Vapour and Mercury Vapour lamps

Thorn

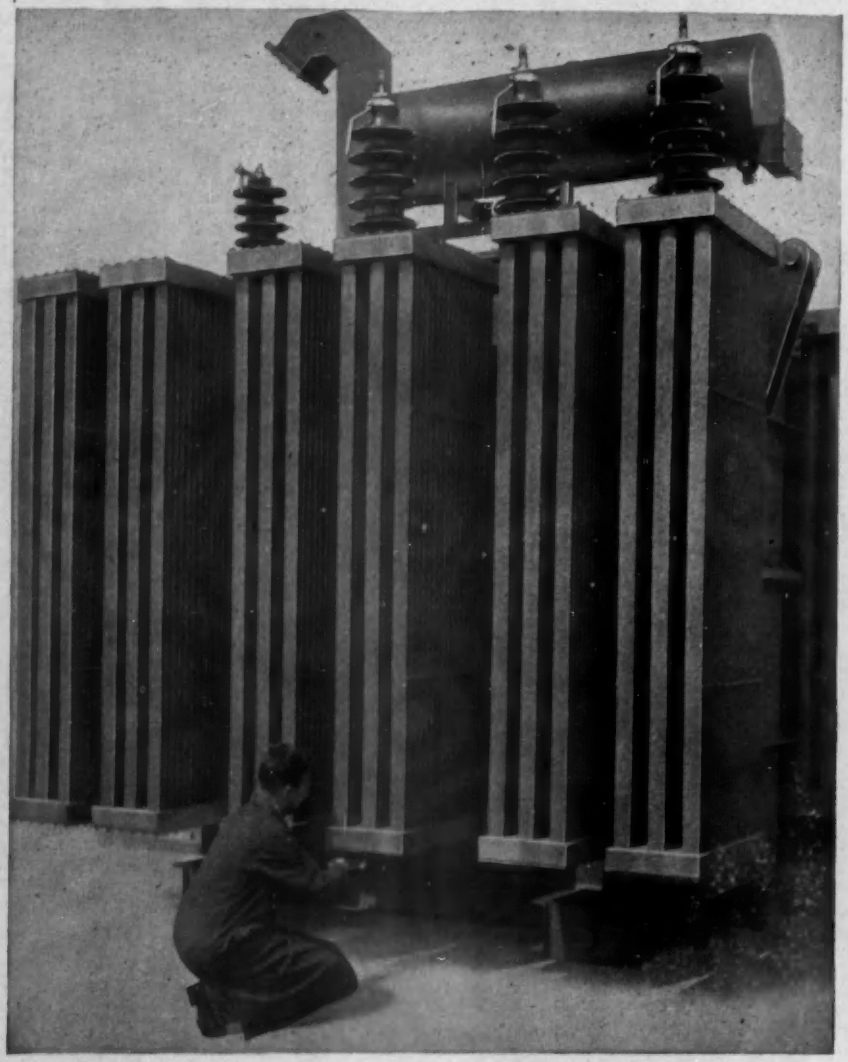
ATLAS LIGHTING DIVISION
THORN ELECTRICAL INDUSTRIES LTD
233 Shaftesbury Avenue London W.C.2

SWS

POWER TRANSFORMERS

Power and Distribution Transformers in all ranges up to 5,000 kVA. and 66,000 volts are manufactured at the Treforest factory.

The Illustration shows a 66,000 volt 2,500kVA transformer supplied to Pakistan.



SOUTH WALES SWITCHGEAR LIMITED

Works at TREFOREST and BLACKWOOD. BLACKWOOD · MONMOUTHSHIRE

PROGRESS IN CONTROL

SUNVIC CONTROLS LTD. (Domestic Division)
No. 1 Factory, Eastern Industrial Estate
Harlow, Essex. Telephone: Harlow 25271

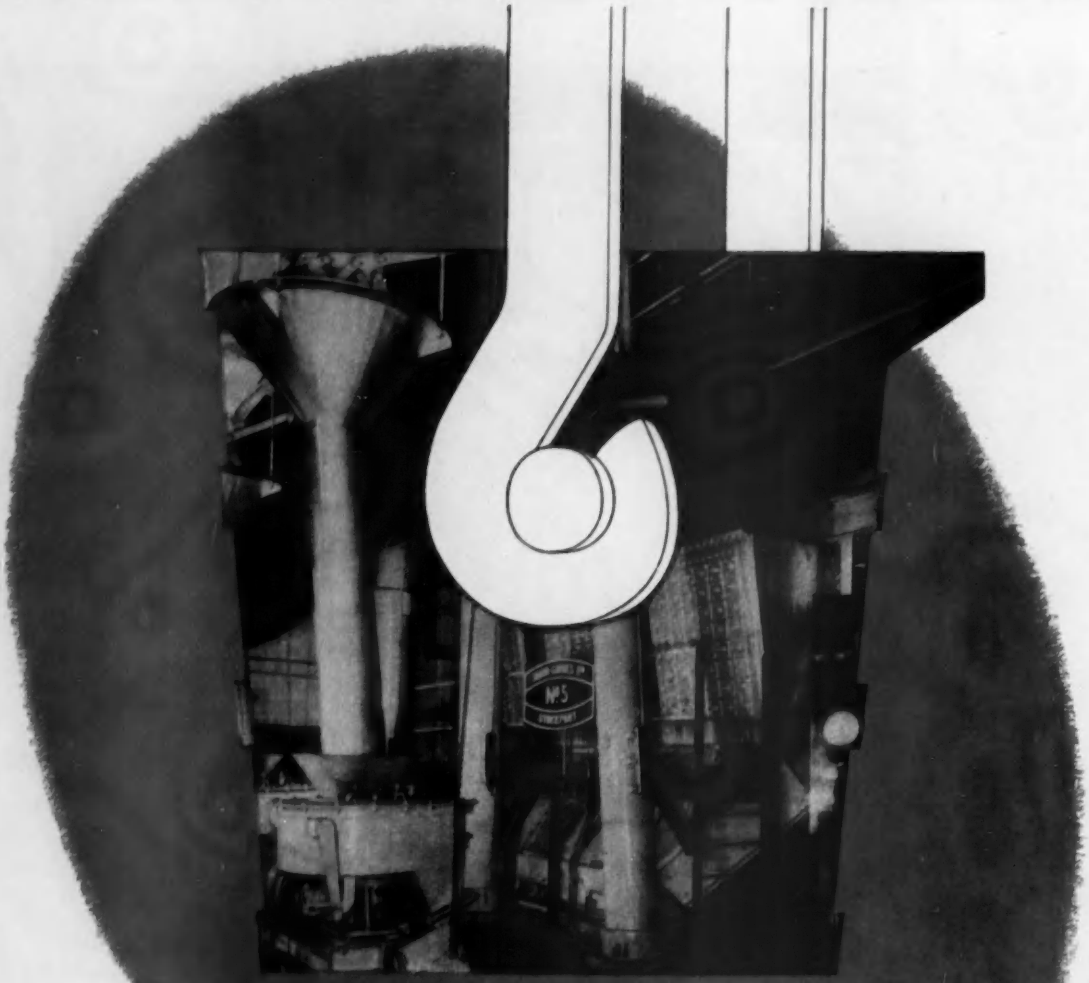
Manufacturers of 'Simmerstat' Regulators, Thermostats, Radiant Hotplates, and Pneumatic and Electrical Instruments for detection, measurement, control and recording of temperature, flow, liquid level, specific gravity and pressure, in science and industry. Vacuum pumping and measuring equipment, etc.

Member of the A.E.I. Group of Companies

**'Simmerstat' is the registered trade mark of Sunvic Controls Ltd.*

EQUIPMENT BY

SUNVIC



STEAM *and the making of steel*

The general expansion in steel production is making complementary demands on Simon-Carves steam raising plant for electricity generation. Four Simon-Carves 87,200 lb/hr boilers have been installed at the Margam works of the Steel Company of Wales and the picture above shows one of the units in an extension comprising two 100,000 lb/hr boilers in the Simon-Carves boilerhouse at the Ebbw Vale steelworks of Richard Thomas & Baldwins Ltd.

Steam power by Simon-Carves Ltd

SIMON ENGINEERING GROUP

STOCKPORT, ENGLAND

OVERSEAS COMPANIES | *Simon-Carves (Africa) (Pty) Ltd: Johannesburg* *Simon-Carves (Australia) Pty Ltd: Botany, N.S.W.*

S.C.96

In Malta as in Great Britain

ELECTRICAL DEVELOPMENT depends on TUDOR

Tudor are supplying fifty 30-volt self-contained switch tripping equipments to J. G. Statter & Co. Ltd. to whom the Crown Agents, on behalf of the Malta Government, have awarded the contract for supply of the 11 kV switchgear required for reconstructing the distribution system. The Consulting Engineers are Messrs. Preece, Cardew & Rider. The reconstruction involves changing from single phase, 100 cycles to 3-phase, 50 cycles which will enable the l.v. system to be standardised at 415/240 volts, 50 cycles.

FOR OVER FIFTY YEARS The Tudor Accumulator Company has specialised in the design and manufacture of batteries for switchgear operation, indication and emergency duties in power stations and substations; and Tudor Batteries have played a large part in the recent expansion of electricity supply in Britain. Wherever they are in service, Tudor Batteries are noted for their outstanding reliability and low maintenance cost under all conditions.

Tudor engineers will be pleased to prepare a specification of the most economical battery scheme to meet your requirements.

Tudor BATTERIES

T.131

THE TUDOR ACCUMULATOR COMPANY LIMITED · 137 VICTORIA STREET · LONDON · SW1

B

'CORRILUX'

—ideal lighting fitting for indoors—because of its excellent appearance; and for outdoors—because the Corrilux is completely weatherproof, will not corrode and is of great strength

LOWEST PRICED 23/6 100w BULKHEAD FITTING

Exceptional strength body made of corrosion-resisting aluminium alloy, frosted finish

Excellent light distribution

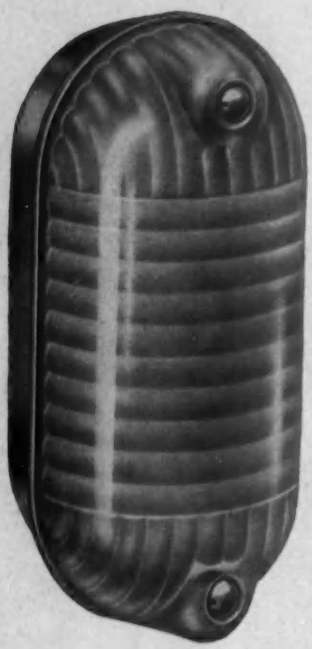
Really attractive appearance and finish

Simple installation—simple maintenance

Completely weatherproof

Better glass mounting 1-piece internally frosted glass of great strength, mounted on non-intercellular rubber gasket

2" centre knockouts and 2 brick-width knockouts for fixing screws



Five ¾" knockout conduit positions

Sealing compound for conduit entry supplied with each fitting

BC lampholder (porcelain) with each Corrilux

Alternative fixing for lampholder position

Holds any lamp up to 100W

Surface or semi-recessed

Through wiring A suitable length of sleeving of glass fibre is supplied to protect cables.

2 secret key screws retain glass. Easily fixed replacement glasses are supplied with captive screws

For passages, corridors, doorways, staircases, toilets, under canopies, and all outbuildings on the farm

MADE BY THE HOUSE OF Simplex

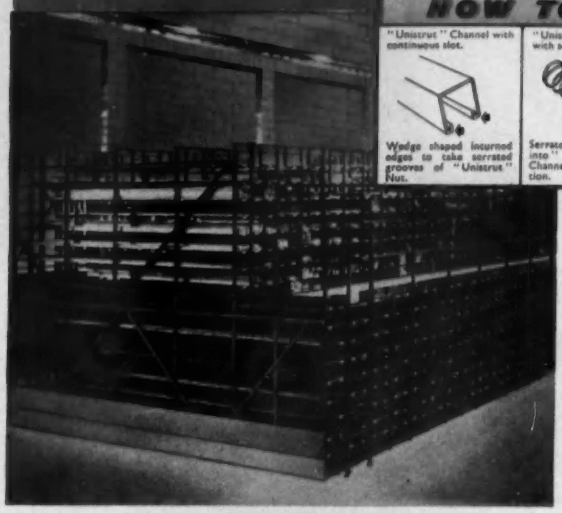
Simplex Electric Co Ltd Blythe Bridge Stoke-on-Trent
London Showrooms: 217-19 Tottenham Court Rd London WC1

A TI COMPANY

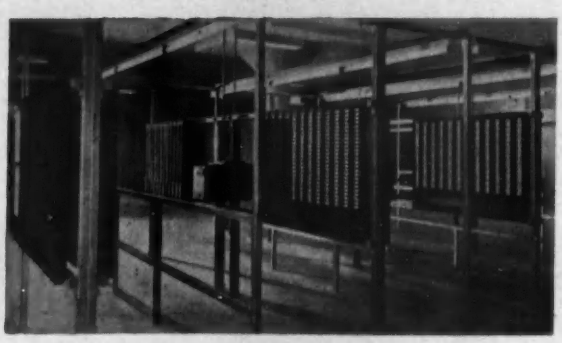
Build it with UNISTRUT

WITH UNISTRUT AND IMAGINATION YOU BUILD IT BETTER AT LOWER COST

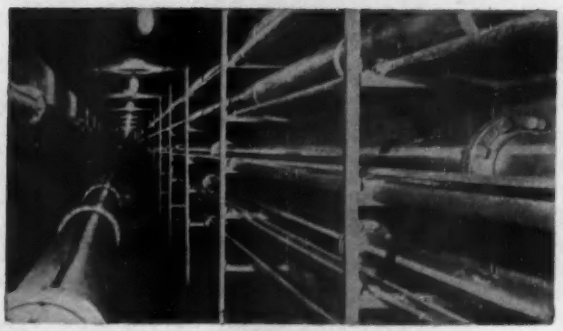
HOW TO BUILD WITH UNISTRUT
"Unistrut" Channel with continuous slot.
Wedge shaped inturned edges to take serrated grooves of "Unistrut" Nut.
"Unistrut" Locking Nut with serrated grooves.
Serrated grooves "bite into" inturned edges of Channel for positive location.
Insert Locking Nut anywhere along continuous slot of channel.
Rounded edges of nut permit easy insertion. Spring (your third hand) holds nut snugly in place for bolting.
Assemble fitting. Nut and Bolt—a turn of the spanner, it's done.



Heavy duty bar stock rack, P1000 construction. Instantly adjustable and re-usable.

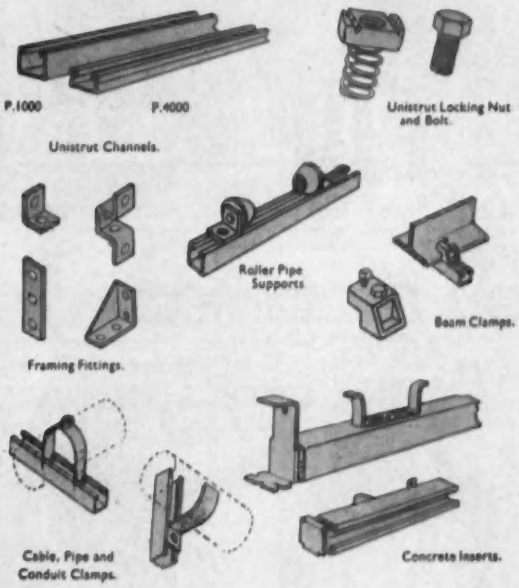


Time Card installation. Neat appearance, rigid construction. With Unistrut the fluorescent lighting problem is solved too !



Unistrut concrete inserts, Pipe clamps and metal framing in tunnel piping installation.

Typical UNISTRUT fittings



UNISTRUT— the new answer to old problems, frame, rack, suspend, support all electrical and mechanical equipment, the quicker and easier Unistrut way. It's cheaper, too.

ALL - PURPOSE METAL FRAMING

UNISTRUT Division of
Sankey-Sheldon LTD.
Dept. (U2/ET7) 46 CANNON STREET
LONDON, E.C.4 Tel: CITy 4477 (12 lines)

In the words of Shakespeare:

"I will a round unvarnished tale deliver"

"Othello" Act I, Scene III

Not of moving accidents by flood and field, or cannibals that each other eat, but of the "POP" Riveting system, the system that enables riveting to be done in one operation, by one operator, working from one side of the material only.

For the full unvarnished tale send for descriptive catalogue, or ask our representative to call and tell you in person.

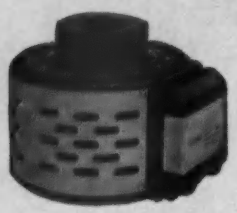
"POP" RIVETING
ONE OPERATOR OPERATION

Geo. TUCKER EYELET Co. Ltd.
Walsall Road **BIRMINGHAM 22**
Telephone: BIRchfields 5024 (7 lines) Telegrams: EYELETS, BIRMINGHAM
Consultants and Tool Manufacturers:
AIRCRAFT MATERIALS LTD. Midland Road, London, N.W.1

"POP" is a regd. Trade Mark of Geo. Tucker Eyelet Co. Ltd.

THE MODERN SYSTEM OF RIVETING

★ Quality components for Industrial Electronics



ROTARY REGAVOLT

Provides a highly economical, compact and reliable means of obtaining a continuously variable output voltage, without the heat losses associated with resistances. In addition, an increase in voltage, above the main supply, can be obtained with three of the four Regavolt models.

BERCOSTAT POWER RHEOSTAT

Made in five sizes from 25w. to 150w. of rugged construction to combine highest mechanical strength with maximum electrical performance. All models are vitreous enamel bonded. Multi-ganged units with any combination of ohmic values are also available.

VITREOUS ENAMELLED RESISTORS

As the result of more than 25 years' hard practical experience in electrical engineering, we are able to offer the widest range of resistors for all purposes.

HERMETICALLY SEALED POTENTIOMETERS

are Type Approved to Class H.1 of RCL 121, 2.5 watt rating for use in Arctic and Tropical conditions. Resistant to damp, heat, cold, fumes, vibration and shock.

★

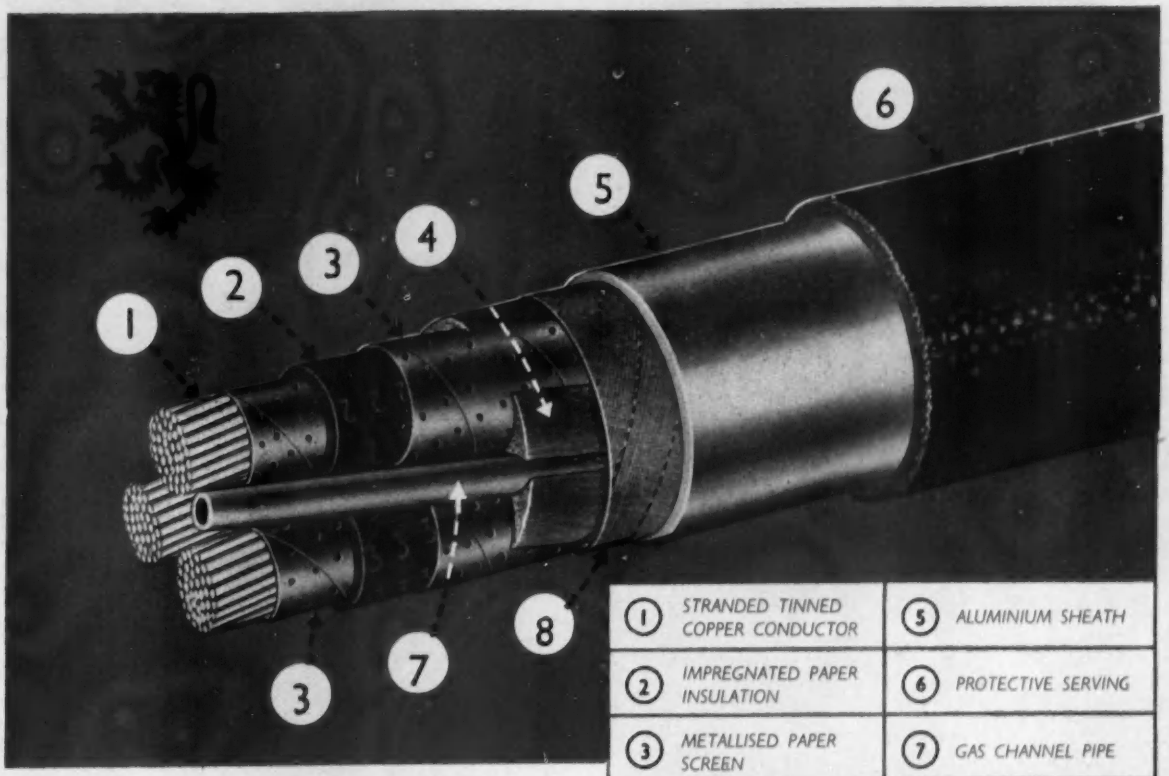
Other products from our wide range include

Protected type shunt field regulators. "REGAVOLT" infinitely variable transformers. Sliding resistances for laboratory use. Range of three moulded knobs with collet fitting for positive grip of circular shafts. Easily fixed and removed. Interchangeable collets for ¼", ⅜" and ½" shafts.

THE BRITISH ELECTRIC RESISTANCE CO. LTD.
QUEENSWAY, PONDERS END, MIDDX. Tel.: HOWARD 2411 Telegrams: VITROHM ENFIELD

BERCO

BR 1292-AH



(1) STRANDED TINNED COPPER CONDUCTOR	(5) ALUMINIUM SHEATH
(2) IMPREGNATED PAPER INSULATION	(6) PROTECTIVE SERVING
(3) METALLISED PAPER SCREEN	(7) GAS CHANNEL PIPE
(4) IMPREGNATED PAPER FILLERS	(8) COPPER WOVEN FABRIC TAPE BINDER

THIS IS THE CABLE CHOSEN FOR 33 kV TRANSMISSION IN SCOTLAND

and this is why...

BICC 33kV Aluminium Sheathed I.P.* Cable can offer a saving of up to 25% in initial costs compared with solid types.

Aluminium Sheathing is a notable technical advance in pressure cable manufacture because it eliminates reinforcement and offers a lightweight cable of simplified construction for high power transmission — at low cost.

A contract for the supply and installation of 6210 yards of this cable has been awarded to BICC by the South East Scotland Electricity Board. Running between Townhill and Nethertown it will be the first cable of this type to be installed in Scotland.

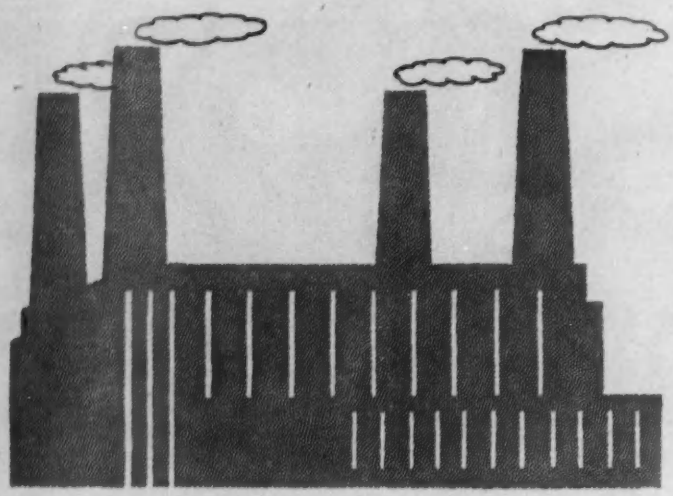
Further information on BICC Aluminium Sheathed I.P. Cable is available on request.

* *Impregnated Pressure.*

BICC

ALUMINIUM SHEATHED IMPREGNATED PRESSURE CABLE

BRITISH INSULATED CALLENDER'S CABLES LIMITED 21 BLOOMSBURY STREET, LONDON, W.C.1



what is the connection?

Progressive farmers today turn to new methods of agriculture in order to increase production. Modernisation makes them increasingly dependent on a readily available supply of electricity.

AWCO Conductors provide the vital link between the source of supply and the consumer. For the distribution of light and power needed on farms, in out-buildings and for machinery installations, AWCO low tension (240-415 volts) All-Aluminium Conductors are most suitable and economical. Their lightness, strength and electrical efficiency result in easy transport and handling, speedy erection and appreciable savings in cost.

Industry and people depend on electricity—

electricity depends on Aluminium.

AWCO

ALUMINIUM WIRE & CABLE CO. LTD.

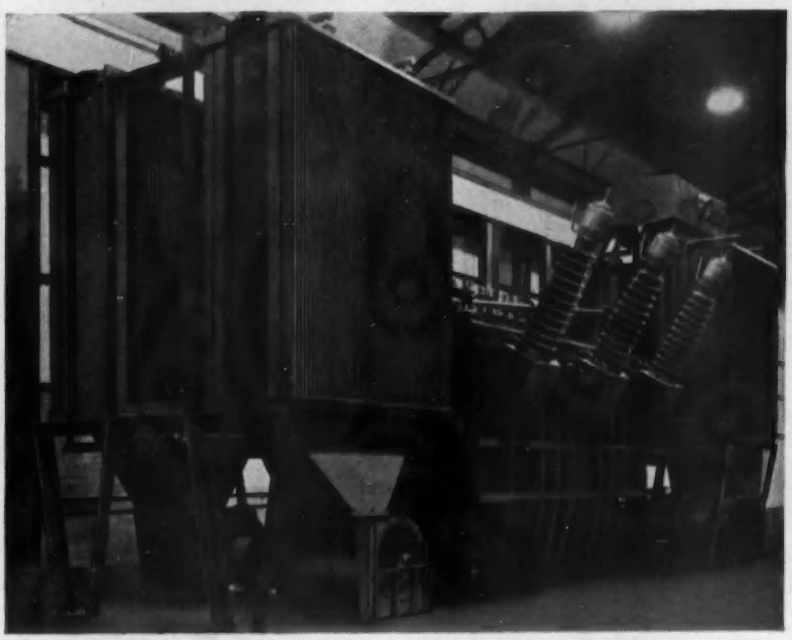
Britain's Largest Manufacturers of Aluminium Wire and Conductors

Head Office & Works: PORT TENNANT, SWANSEA, GLAMORGAN

Sales Office: 30 CHARLES II STREET, ST. JAMES'S SQUARE, LONDON, S.W.1.

Telephone: TRAfalgar 6441

Yorkshire



transformers

AND

MAGNETICALLY-SHIELDED

reactors

60,000 kVA 132,000 volts

YORKSHIRE YET TRANSFORMERS

YORKSHIRE ELECTRIC TRANSFORMER CO. LTD.
THORNHILL, DEWSBURY, YORKSHIRE

Telephone: DEWSBURY 1691-2

SPECIALISTS FOR OVER 30 YEARS

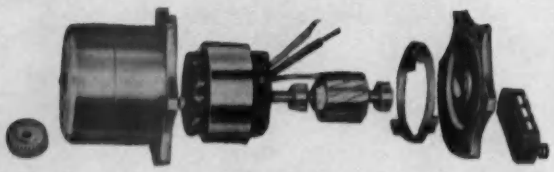
METER BOARDS
SWITCH BLOCKS
SWITCH BOXES
ELECTRICAL
WOODWORK

FIRST CLASS WORK · QUICK DELIVERY · COMPETITIVE PRICES

WOOTTON & CO. LTD

ALMA WORKS, PONDERS END · MIDDLESEX · TELEPHONE: HOWARD 1858

SMALL
PRECISION MOTORS
FOR SPECIALISED APPLICATIONS



S. G. Brown Ltd

OFFER A RANGE OF
10 SMALL MOTORS OPERATING AT VARIOUS VOLTAGES
UNIQUE DESIGN
EXCEPTIONAL PERFORMANCE
HIGH GRADE FINISH

AS SUPPLIED TO THE BRITISH ADMIRALTY AND OTHER GOVERNMENT DEPARTMENTS

For full Details and Technical Specifications write

S. G. BROWN LTD.
SHAKESPEARE STREET, WATFORD, HERTS
TEL.: WATFORD 7241

CYLINDER JACKETS
BY EETO

THE UNIVERSAL CHOICE

UNAPPROACHABLE in quality and performance. EETO jackets are still the finest in the world.

EETO SERVICE IS PROMPT AND EFFICIENT.

EETO INSULATIONS
RIVER ST BOLTON LANCS
TEL BOLTON 3764

CW1986/143

13	·092	7·95	12·5	17·4	22·4	27·3	33·1	39·2	46·4	54·9	60·5
14	·080	6·60	10·3	14·3	18·3	22·2	26·5	31·0	35·6	41·2	45·9
15	·072	6·10	9·65	12·9	16·7	20·5	24·2	27·8	31·4	35·8	41·0
16	·064	5·10	7·90	10·5	13·3	16·5	19·8	23·3	26·8	31·0	36·4
17	·056	4·10	6·95	8·90	11·3	13·9	16·6	19·6	22·4	25·5	29·1
18	·048	3·05	5·10	6·50	8·50	10·3	12·4	15·1	17·9	20·3	23·7
19	·040	2·41	3·98	5·10	6·38	7·75	9·30	10·9	12·5	14·3	16·8
20	·036	2·16	3·45	4·42	5·63	[illegible]	8·10	9·56	11·2	13·2	15·0
21	·032	1·60	2·50	3·[illegible]	[illegible]	[illegible]	[illegible]	7·85	9·07	10·3	12·3
22	·028	1·23	2·00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7·45	8·70	10·2
23	·024	1·03	1·6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5·85	6·95	8·20
24	·022	·925	1·53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5·33	6·26	7·20
25	·020	·840	1·35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]07	4·82	5·60	6·07
26	·018	·795	1·19	1·[illegible]	[illegible]	[illegible]	[illegible]	3·46	4·05	4·75	5·37
27	·0164	·710	1·07	1·42	1·80	2·23	2·70	3·14	3·62	4·11	4·70
28	·0148	·615	·930	1·24	1·56	1·88	2·23	2·60	2·98	3·41	3·92
29	·0136	·510	·720	1·07	1·33	1·58	1·89	2·24	2·60	2·99	3·44
30	·0124	·390	·590	·860	1·07	1·31	1·63	1·96	2·32	2·68	3·05
31	·0116	·340	·525	·752	·940	1·16	1·40	1·66	1·96	2·36	2·76
32	·0108	·300	·467	·663	·833	1·03	1·25	1·50	1·78	2·16	2·55
33	·010	·262	·410	·590	·746	·925	1·14	1·41	1·70	2·02	2·40

"NICHROME"
REGISTERED TRADE MARK

'THE GREATEST NAME IN ELECTRICAL RESISTANCE MATERIALS'

THE NICKEL-CHROMIUM ALLOYS protected by the registered trade-mark "Nichrome" hold a pre-eminent position which is universally accepted.

"**Nichrome**" **V** (80/20) is recognised as the most advanced development in alloys for use as resistors at temperatures up to 1150° C.

"**Nichrome**" (65/15) is the highest standard of quality for resistance wire in appliance heating at temperatures up to 950° C.

The useful life of "Nichrome" alloys is far superior to that of all other alloys when tested at normal operating temperatures.

For full information on the properties and characteristics of these and other alloys, please ask for a copy of "THE ELECTRICAL ALLOY DATA BOOK" (free on request).

BRITISH DRIVER-HARRIS CO. LTD MANCHESTER 15

Nickel and Nickel Alloy Specialists: Alloys for Domestic appliances; Furnace Elements and in Furnace Construction; Thermocouples; Radio, TV and Lamps (sleeves, anodes, grids, filaments, supports, glass-metal seals, etc.); Spark Plugs (centre and side electrodes and such as special strip for stamping out multi-point discs for aircraft plugs); Super Fine Wires; etc.

The standard of quality and performance the world over

'ENGLISH ELECTRIC'

h.r.c. fuse links

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Fusegear Division, East Lancashire Road, Liverpool 10

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

FG.9

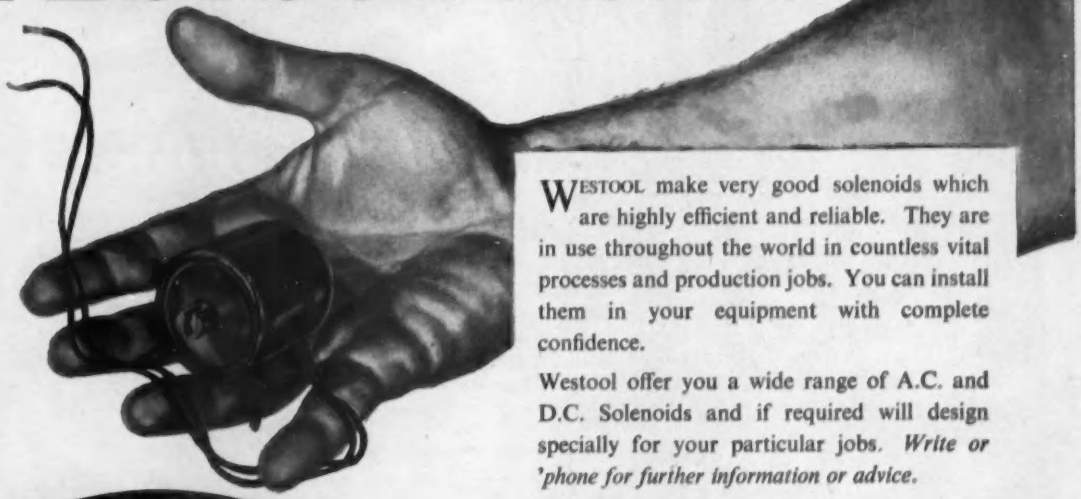
NOW — "OFF THE SHELF" DELIVERY!

The complete range of Westool A.C. Solenoids is now available with "off the Shelf" delivery— D.C. Solenoids with early delivery.

PUSH
PULL
OPEN
SHUT
LIFT
or DROP

more efficiently with

WESTOOL Solenoids



WESTOOL make very good solenoids which are highly efficient and reliable. They are in use throughout the world in countless vital processes and production jobs. You can install them in your equipment with complete confidence.

Westool offer you a wide range of A.C. and D.C. Solenoids and if required will design specially for your particular jobs. *Write or 'phone for further information or advice.*

WESTOOL LIMITED

ST. HELEN'S AUCKLAND, CO. DURHAM

Telephone: **West Auckland 317 (4 lines)** ***Cables:*** **Solenoid, West Auckland**

Export enquiries to Export Managers: **Stamm & Partners Ltd., 59 St. Martin's Lane, London, W.C.2**
Telephone: **Temple Bar 5383 (10 lines)** ***Cables:*** **Stamstam, London**

Westool also make Coil Winders Transformers Coils Worm Electric Brakes and Clutches Grinders Small Motors Air Conditioners etc.

TIB 22A

Constantly handled...

CRESSALL Rheostats and Potentiometers are designed and constructed to withstand the constant handling made necessary by the heavy demands of modern industry. In the assembly of delicate components this calls for quality control in a high degree. CRESSALL methods of manufacture are based on forty years' experience—a guarantee of constant service and dependability under the most exacting conditions. Whatever *your* requirement, there is a CRESSALL component to meet every need in the whole power range.

CRESSALL

THE CRESSALL MANUFACTURING CO. LTD. · TOWER STREET · BIRMINGHAM 19
TELEPHONE: ASTON CROSS 2666 (3 LINES) · TELEGRAMS: "OHMIC, BIRMINGHAM"

Industry is going over to these Nylon Bushings in a big way

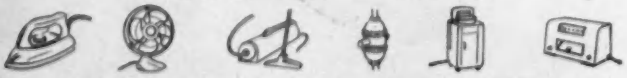
they're

NYLON STRAIN RELIEF BUSHINGS

(FULLY PATENTED)

Since their introduction to this country from the U.S.A. I.M. NYLON STRAIN RELIEF BUSHINGS are being used by an ever-increasing variety of trades :—Clocks, Radios, T/V., Fans, Toasters, Mixers, Vacuum Cleaners, Washing Machines, Portable Tools, Air Conditioners, Electric Mowers, Clippers, Drills, Saws, etc. They are rapidly becoming "Standard" where a positive, insulating, non-slip grip is essential. Made from Nylon, they grip tightly without nipping and give a streamlined appearance to the job.

Some typical applications of I.M. Nylon Bushings



Easily applied — place Bushing on wire, push into hole — that's all!

May we send you samples and technical leaflet.

Approved by American, Canadian, Norwegian, Standards Associations.

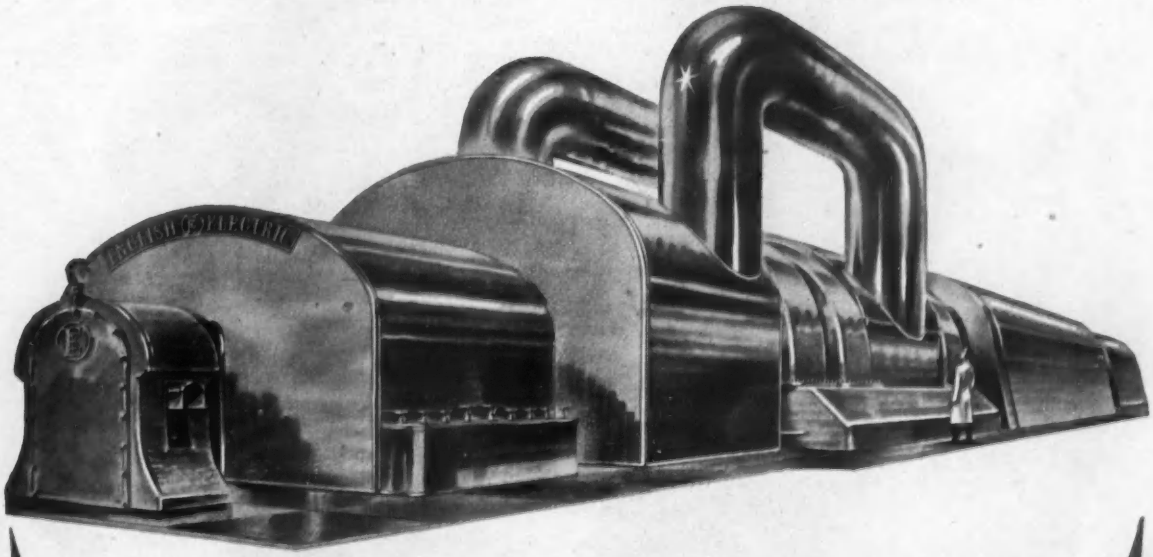
INJECTION MOULDERS *Ltd*

Westmoreland Road, London, N.W.9. Tel: COLindale 8860, 8868/9 Cables: INJECMOULD, HYDE, LONDON

1943

Two more 200 MW turbo-alternator sets ordered from 'ENGLISH ELECTRIC'

by the Central Electricity Authority



To be installed in the new power station which the Central Electricity Authority, subject to Ministerial consent, proposes to build on the Trent at High Marnham, each of these units is more than three times as powerful as the largest and latest 3,000 r.p.m. generating units yet in service in Britain, and each will have a higher output than most of the complete power stations now operating.

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Steam Turbine Division, Rugby.

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

ST.1915

BP

ENERGOL

LUBRICANTS

for every industrial requirement

Distributors

THE POWER PETROLEUM CO. LTD.

Head Office: 76/86 Strand, London, W.C.2.
(Branches & Depots throughout the Country)

Our Technical Department will be pleased to advise on your lubrication requirements and problems.

For the 3rd year running...

AN IC-EQUIPPED GENERATING STATION HEADS THE CEA THERMAL EFFICIENCY TABLE* WITH A RECORD EFFICIENCY

*For the 12 months period ending March 31st 1955

Fuel Efficiency Exhibition, Manchester. 12-22 October 1955. Stands 36 and 47

OTHER IC EQUIPPED GENERATING STATIONS HIGH ON THE LIST:

Littlebrook "B" 30.49%
Skelton Grange 28.89%
Brunswick Wharf 28.70%
Poole 28.31%

TOP PORTOBELLO H.P.

for the second consecutive year, with a thermal efficiency of 31.42%

Firing equipment with a total generating capacity of 8,000,000 lbs. steam/hour was supplied to the C.E.A. alone by IC, during the year.

FACTS LIKE THESE SPEAK FOR THEMSELVES

Europe's Largest Generating Station. The contract for complete steam generating plant at High Marnham, was recently awarded to International Combustion.

IC INTERNATIONAL COMBUSTION LIMITED

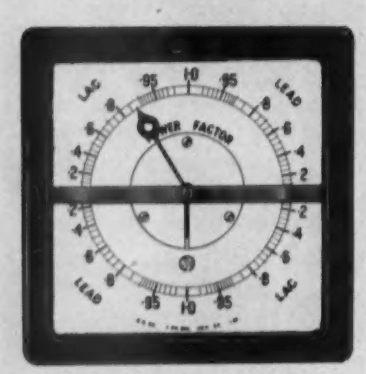
London Office: Nineteen Woburn Place, W.C.1. Tel. Terminus 2833. Works: Derby, England; Port Elizabeth, South Africa; Sydney, Australia

TGA. 5G14A

NALDERS

ELECTRICAL MEASURING INSTRUMENTS

INDICATING · RECORDING
SWITCHBOARD · PORTABLE



NALDERS Electrical Measuring Instruments cover a wide range—indicating, recording, switchboard, portable. Cases are of rectangular, square or round pattern in diecast aluminium or pressed steel, finished bright black stove enamel or other colour to customer's requirements. *We shall welcome your enquiries.*

We can meet your demands for
PROMPT DELIVERY

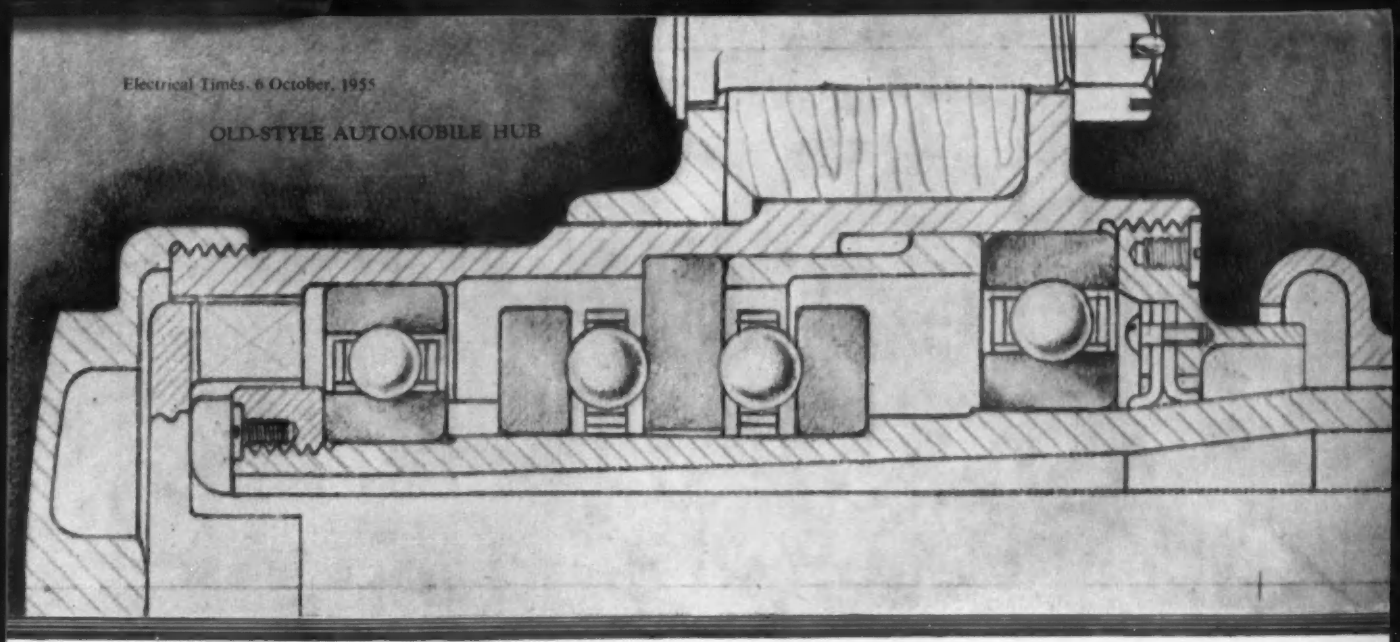
NALDERS PRODUCTS include

MEASURING INSTRUMENTS of ALL TYPES
also
PROTECTIVE RELAYS
VECTORMETERS
Automatic Earth Proving SUPPLY SWITCHES
"BIJOU" CIRCUIT BREAKERS

NALDER BROS. & THOMPSON LTD.

DALSTON LANE WORKS · LONDON · E.8

Telephone: Clissold 2365 (3 lines) Telegrams: "Occlude, Hack, London."



. . . them days has went!

IT is astounding that many designers, looking ahead in many other respects, think in terms of ball-bearings dating back to the hobble-skirt period — eminently suitable for the suburban lawn mower but having nothing up their sleeves in the way of refinement or potentialities for pepped-up performance.

Things have altered; nearly every new design of machine has a higher performance than its predecessor, yet before a couple of years have passed, it is being given a higher load, or a greater speed or some other extra duty, *and the bearings are expected to 'take it'.*

There they are, often pinched a bit to begin with, generally buried away in a densely built-up area where it's a major operation to alter anything; their diameters may be limited by the shaft centres, and from a state of being forgotten as taken-for-granted components they suddenly become urgent matters of the moment.

We at F.B.C. have—in the best circles—a very high reputation for helping out on this problem and we are constantly evolving bearings for meeting high loads, high speeds and other conditions with outstanding success in aircraft, machine tools and many other branches of engineering.

DESIGNERS who put their dusty ball-bearing catalogues to one side and turn to us for consultation will find that our engineers are full of high-performance experience.

FBC

TRADE MARK

ALL-BRITISH
BALL AND PARALLEL-ROLLER BEARINGS

FISCHER BEARINGS COMPANY LIMITED, WOLVERHAMPTON

FISCHER BEARINGS COMPANY LTD. and TIMKEN-FISCHER STOCKISTS LTD., BIRMINGHAM
are both subsidiaries of BRITISH TIMKEN LTD.

F.B.C. :: FISCHER

Between this girl's bath
and the wall
There used to be nothing
at all
Till a lively young lad
Thought: I've got it,
begad!
PVC would undoubtedly
make an effective,
economical, attractive and
easy-to-fit sealing-strip.

A motor designer from
Lancs
Gratefully murmured his
thanks
When a Lorival chap
After doffing his cap
Suggested that PVC
would make an effective,
economical and easy-to-fit
petrol tubing.

Some limericks – from the

A fireman, talking aloud
Made this remark to the
crowd
Some boffin, I hear
Has a darned good idea
He says that PVC
would make a remarkably
effective, tough, durable
fire hose lining.

There once was a
Scotsman of Fife
Whose packaging
problems were rife
Until one day he spoke
To a Lorival bloke
Who said that PVC
sheeting would be an
effective, economical,
moisture-and-chemical-
proof answer to his
packaging problems.

lively lads at Lorival . . .

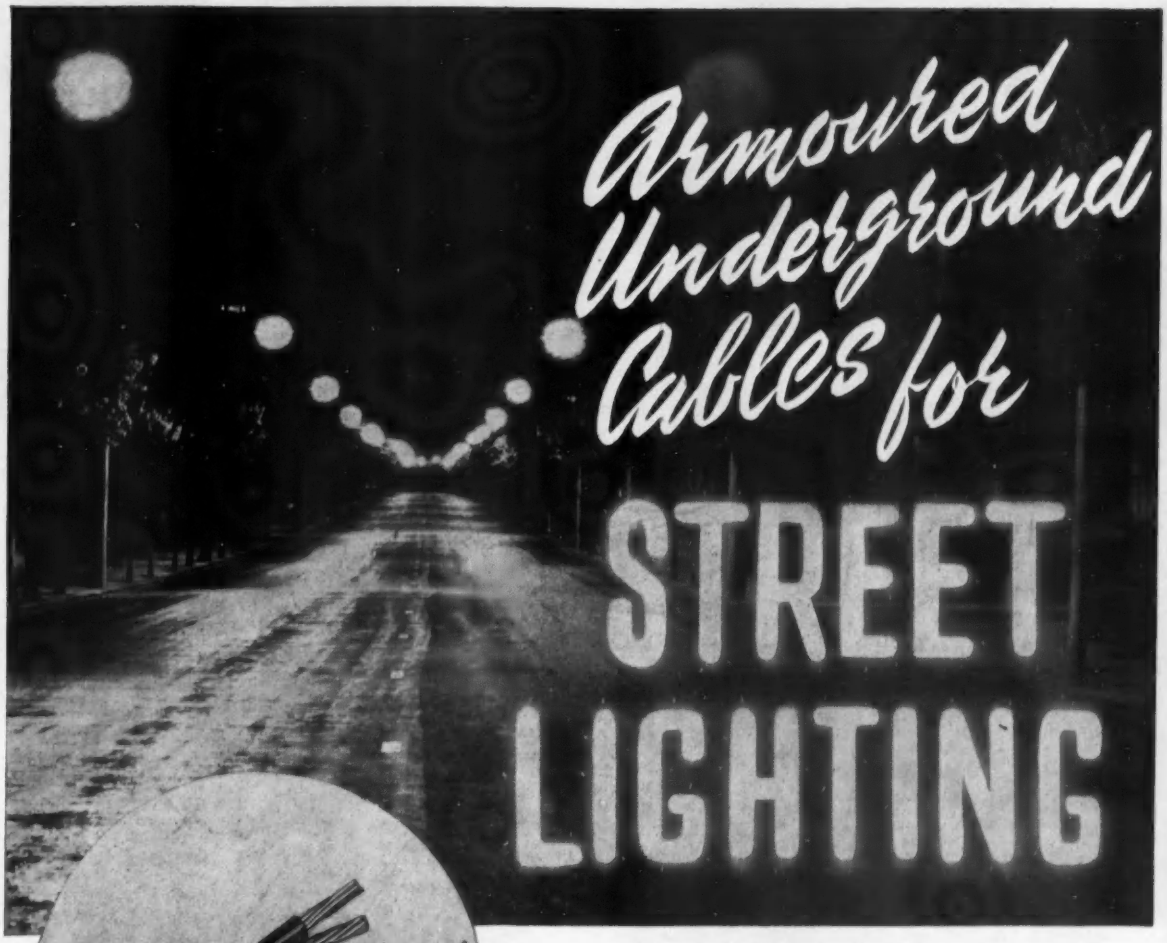
An electrical fellow
near Speke
Discovered a terrible
leak
But along came his
mate
At a helluva rate
Saying that Lorival
PVC would make an
effective, economical
insulating material for
all sorts of electrical
work.

PVC, in the hands of Lorival's lively lads, can do a lot of jobs better and cheaper. Why not drop a line to Lorival? Then you can get together with the lively lads and figure out ways and means of using PVC to your advantage.

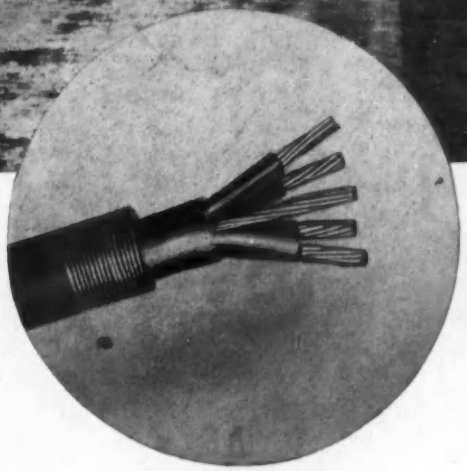
LORIVAL PLASTICS

United Ebonite & Lorival Ltd., Little Lever, Nr. Bolton, Lancs.

L63



Armoured Underground Cables for STREET LIGHTING



Send for Catalogue and Leaflets

CABLE of Quality

MANUFACTURED UNDER THE SUPERVISION OF EXPERTS OF LONG STANDING IN THE INDUSTRY

NOW ALSO BEING USED FOR ILLUMINATING **ZEBRA CROSSINGS**

WANDLESIDE CABLE WORKS LTD.

106 Garratt Lane, Wandsworth, London, S.W.18

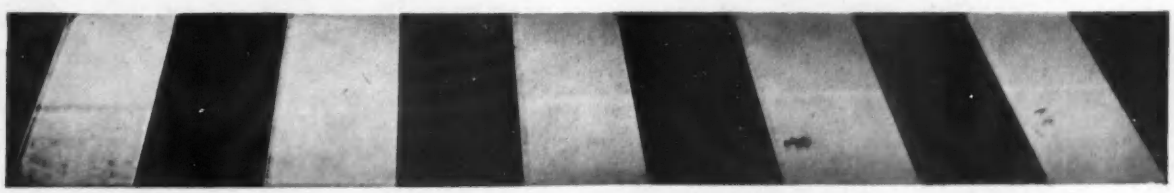
Telephone: BATtersea 2273 (5 lines)

Telegrams: "Wandleside, London"

London Office and Stores: 30, Tottenham Street, W.1

Telephone: LANgham 8317

One of the FALKS GROUP

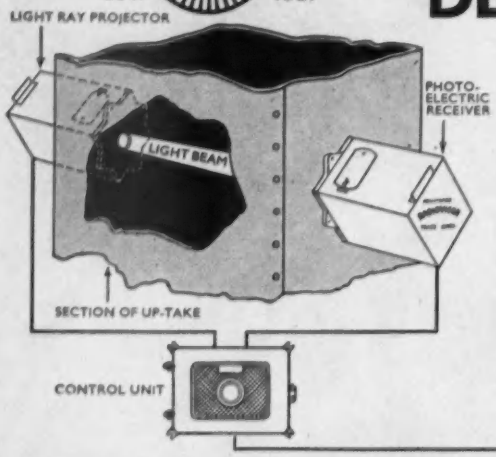


C

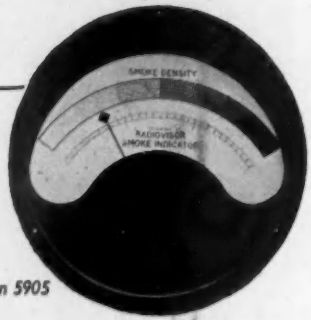
RADIOVISOR
EST. 1927

INDUSTRIAL SMOKE DENSITY INDICATOR

Used by Leading Industrial Companies for the past 25 years



The Radiovisor Industrial Smoke Density Indicator is in extensive use in Power Stations and Industrial Installations to give a continuous record of the smoke passing through a flue or up-take. A beam of light is projected across the flue on to a Photo-Electric Cell. The intensity of light received by the latter, and consequently the photo-electric current, is governed by the smoke density. After amplification, the photo-electric current is indicated on instruments having a Ringelmann Smoke Scale. The Radiovisor Smoke Density Indicator operates during the whole 24 hours, indicating and recording the density of smoke emitted and showing the operator when attention is needed. In addition, an accurate record is available to the Management to prove they are not contributing to air pollution. *There is a range of standard equipment to cover all sizes and types of installations.*



OTHER RADIOVISOR PHOTO-ELECTRIC & ELECTRONIC CONTROLS include:

FLAMESTAT FLAME FAILURE CONTROL	TURBIDITY EQUIPMENT	FACTORY LIGHTING CONTROL
SMOKE ALARM	HOPPER & BUNKER LEVEL CONTROL	AUTOMATIC RADIATION PYROSTAT
SMOKE DETECTOR FIRE ALARM	PHOTO-ELECTRIC SAFETY GUARD	AUTOMATIC DOOR OPENING

RADIOVISOR PARENT LTD., 1 STANHOPE STREET, LONDON, N.W.1 *Tel: ★EUSton 5905*

THE FIRST NAME IN PHOTO-ELECTRIC CONTROLS

ODDIE FASTENERS

PAT. No. 507249

The FASTENER with ENDLESS APPLICATIONS
SIMPLE — POSITIVE — SELF LOCKING

Made in a variety of types and sizes

SPECIAL FASTENERS TO SUIT CUSTOMERS' REQUIREMENTS

Widely used in the Electrical Industry

DEPT. : E.T.

ODDIE, BRADBURY & CULL LTD.

SOUTHAMPTON

Tel. : 55883 Cables : Fasteners, Southampton

THE "FLUXITE QUINS" AT WORK

"We've accomplished the first space-flight
Thanks to speedy repairs with FLUXITE
Is this Venus, old boy?"
"No, its not!" shouted Ol
"We're back in the old Isle of Wight!"

Make a quick success of that soldering job—use Fluxite Paste. Suitable for all metals, except aluminium. Even solders and "tins" *dirty* metals! And, remember, Fluxite "wipes" joints that other methods won't touch. Used for generations in Government Works and by leading Engineers and Manufacturers. Of all Ironmongers in tins from 1/- upwards. GM.20

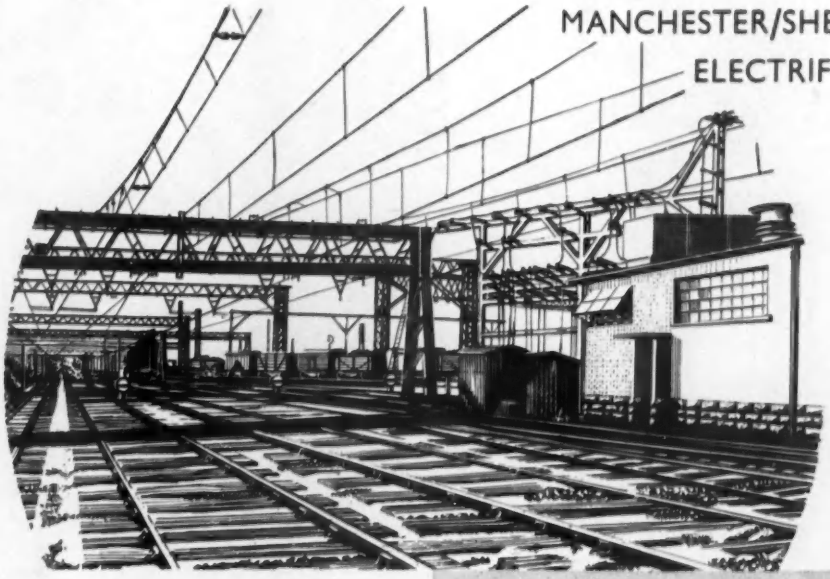
FLUXITE

SOLDERING PASTE

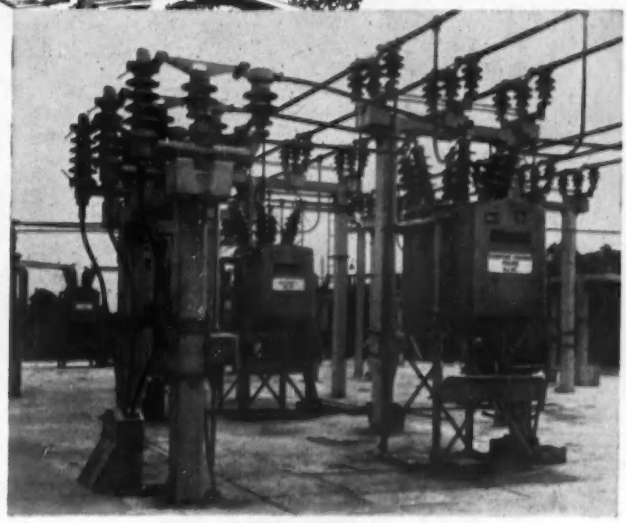
A STAUNCH COMPANION TO FLUXITE SOLDERING FLUID

Simplifies ALL *Soldering*

FLUXITE LTD BERMONDSEY ST · LONDON S·E·1



MANCHESTER/SHEFFIELD/WATH
ELECTRIFIED RAILWAY



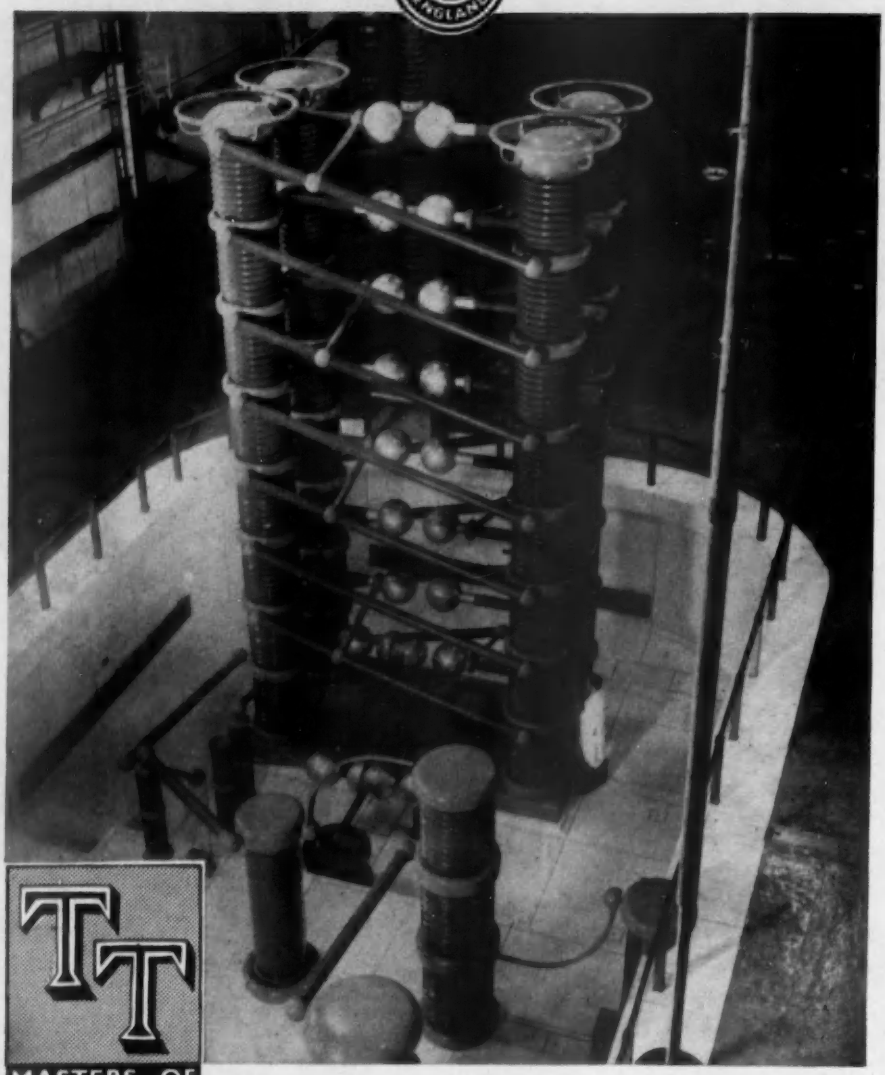
The 33-kV 500/750-MVA circuit-breakers and associated equipment for all the main distribution sub-stations were supplied by REYROLLE

ALDHAM JUNCTION · STRAFFORD CROSSING
BARNSLEY JUNCTION · DUNFORD · GORTON
NEWTON · HADFIELD · WOODHEAD · WHARN-
CLIFFE WOOD · NEEPSEND · ORGREAVES

Reyrolle

A. REYROLLE & CO LTD. · HEBBURN · COUNTY DURHAM · ENGLAND

Over Eighty Eight Years of Service *to the Electrical Industry...*



TT
MASTERS OF PORCELAIN INSULATION

THIS 3.2 MILLION VOLT 77KW SECONDS SURGE GENERATOR, recently installed at the National Physical Laboratory, Teddington, is believed to be the largest in this country. Each of the eight stages consists of two capacitors, in separate T.T. porcelain housings, to provide a total stage capacitance of 0.12 μF. The maximum stage voltage is 400 kV.

THE GENERATOR

USES T.T. PORCELAIN INSULATORS THROUGHOUT

Acknowledgments are made to the Department of Scientific and Industrial Research for permission to publish the photograph and to Messrs. Ferranti Ltd., who designed and constructed the generator.

TAYLOR TUNNICLIFF & CO. LTD.

Head Office : EASTWOOD, HANLEY, STAFFS.
Telephone : Stoke-on-Trent 25272-4

London Office : 125 High Holborn, W.C.1
Telephone : Holborn 1951

285 MILES OF 33kV OIL-FILLED CABLE...

The Change of Frequency Scheme on the Southern Region of British Railways will result in greater all-round operating efficiency when the modern equipment now being installed comes fully into operation. For this far reaching scheme on the world's largest electrified suburban railway system, Pirelli-General is supplying 285 miles of 33 kV. oil-filled cable and some 66 kV. oil-filled cable. Over 250 miles of paper-insulated pilot/supervisory cable will also be supplied.

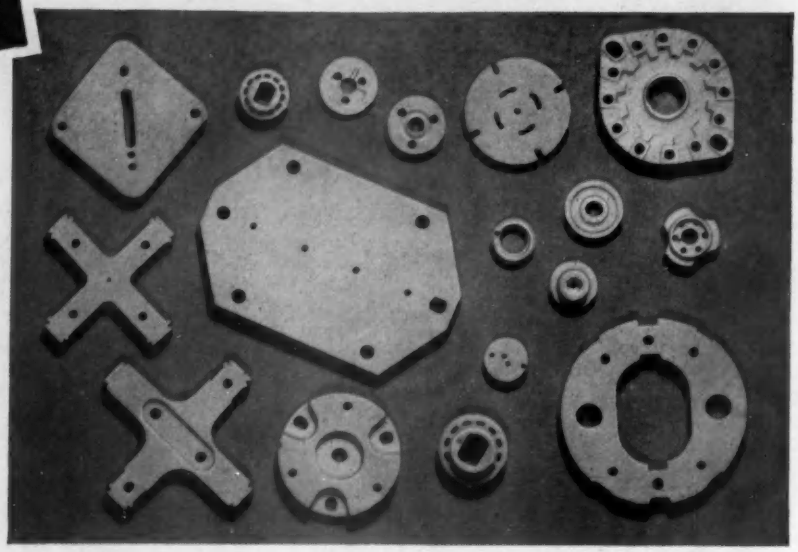
Pirelli-General engineers are laying and jointing these cables usually under possession of the adjacent railway track, which necessitates much night and week-end work when the track is relatively free from traffic.

PIRELLI-GENERAL *cables*

PIRELLI-GENERAL CABLE WORKS LTD., SOUTHAMPTON

ASSOCIATED COMPANY OF THE GENERAL ELECTRIC CO. LTD.

BRAY electro-ceramic insulators



Precision built,
mass produced to close
dimensional tolerances
for use in electronic,
radio and telecommunication
apparatus.

Please write for our latest catalogues

GEO. BRAY & CO. LTD. LEICESTER PLACE, LEEDS 2

TELEPHONE 20981 (9 lines) TELEGRAMS "BRAY LEEDS 2"

AUTOMAT
SELENIUM RECTIFIERS
to any rating

DROP US A LINE OR DIAL SWinton 2765

AUTOMAT

366 MOORSIDE ROAD, SWINTON, MANCHESTER

C.W.3249

RELAYS

The most important factor in a relay is its reliability. The contact must at all times be positive whether it is used every few seconds or only once a year. Many years of experience have shown that, for most applications, the mercury switch is the most reliable.

Isenthal Electro-Magnetic Relays employ totally enclosed gas-filled mercury switches the contacts of which remain clean indefinitely. The catalogue lists relays with current carrying capacities of up to 30 amperes A.C. or D.C.

Examples are: the type 'RN' which is silent in operation on A.C. and completely free from "sticking" on D.C.; type 'RND' which is similar to type 'RN' but with delayed 'make' or 'break'; type 'SBS' which can be fitted with up to three switches working simultaneously or in any desired sequence—a feature which makes it eminently suitable for process control; and type 'V15T' which is sensitive enough to be operated by contact thermometers and similar delicate instruments.

For details of complete range, please write for illustrated list.

ISENTHAL

Isenthal & Co. Ltd., Ducon Works, Victoria Road North Acton, London, W.3. Telephone: ACOrn 3904. Telegrams: Isenthal, London.

B. 11A

WE HAVE JOINED FORCES . . .

Britannic Cables Ltd

and

General Cable Manufacturing Co Ltd

have joined forces to work as an integrated group, pooling all their resources of plant, experience and manufacturing skill.

The combination of BRITANNIC's specialised knowledge of paper insulations and G.C.M.'s long experience with plastic and rubber insulations enables the new group to offer now a *complete* service to cable users in any part of the world. Whatever need arises in the continually-widening development of electrical supply—whether for cables of standard specification or for specialised industrial types — the group can now supply it.

The associated companies were *independent* companies. The new group is an *independent* group, with all the advantages this spells for its customers in prompt service and flexible price arrangements. Prove these advantages in any cable problems now confronting you.

BRITANNIC CABLES LTD · IVER · BUCKS

GENERAL CABLE MANUFACTURING CO LTD · LEATHERHEAD · SURREY

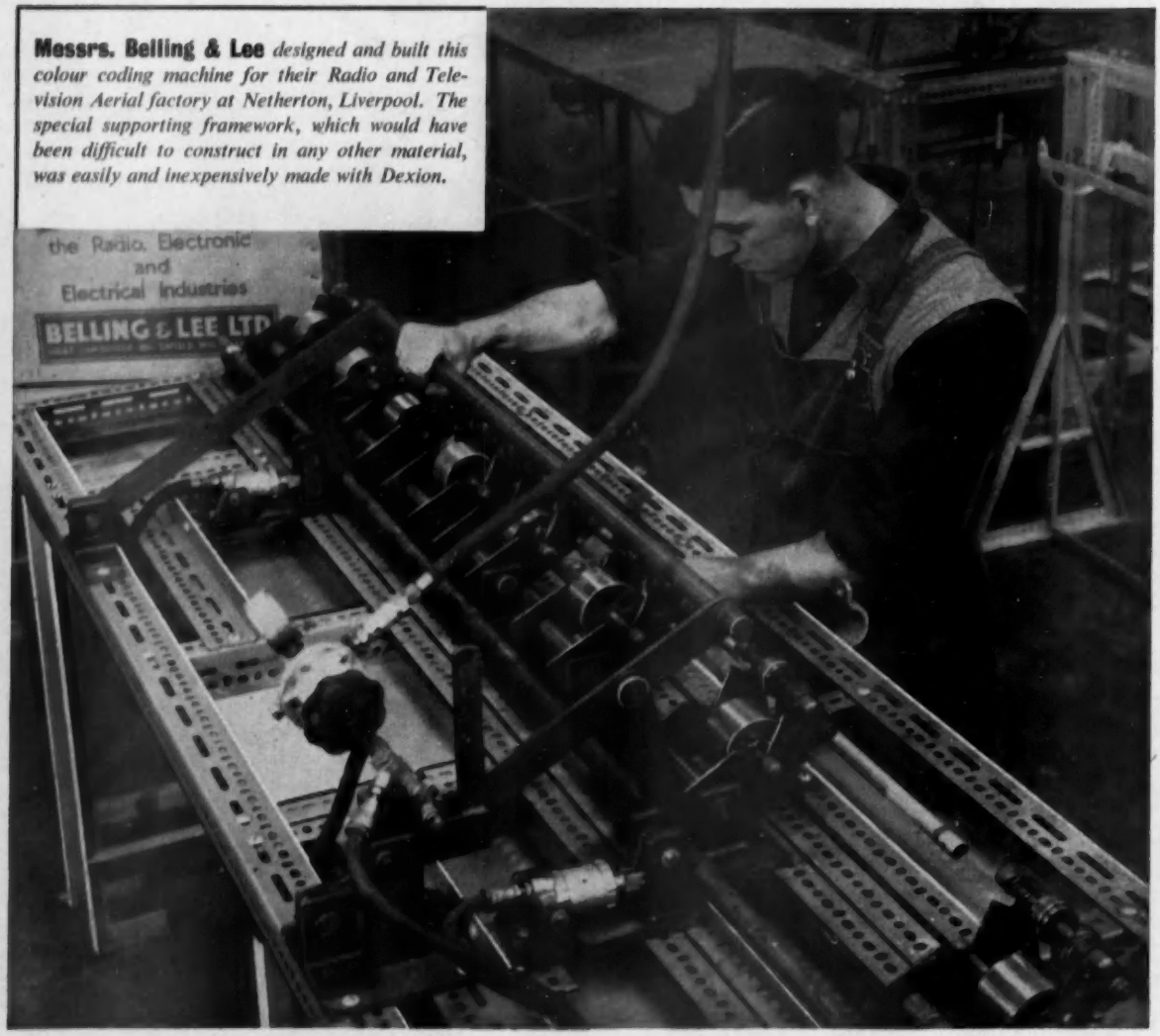
BUILD YOUR OWN

quickly, cheaply, strongly, *exactly*

FOR almost any kind of works or storage equipment you may need — storage racking, machine stands, trolleys, work-benches, maintenance platforms, and a hundred other items—you'll find Dexion Slotted Angle the sturdiest, cheapest, most versatile material.

Dexion is far easier and quicker to work with than wood or angle iron. It merely needs cutting and bolting — no precise measurements or drawings, no drilling or welding, no skilled carpentry, no painting. *The work has been put into it already*, so that unskilled labour can handle any job. You get exactly the structures you need, without delay, and generally at a big saving.

Dexion is scientifically designed so that every slot and hole has a function, and the remaining metal is left where it gives greatest strength. It *continues* to save you money, because any Dexion structure can be swiftly altered or dismantled and the Dexion used again. There is no waste, no scrap.



Messrs. Belling & Lee *designed and built this colour coding machine for their Radio and Television Aerial factory at Netherton, Liverpool. The special supporting framework, which would have been difficult to construct in any other material, was easily and inexpensively made with Dexion.*

EQUIPMENT—

as you want it—with versatile

DEXION slotted angle

Dexion is the Slotted Angle that started an industry. Now, over 100 million feet are being used by more than 60,000 firms all over the world. *And 80 per cent of Dexion sales are repeat orders.*

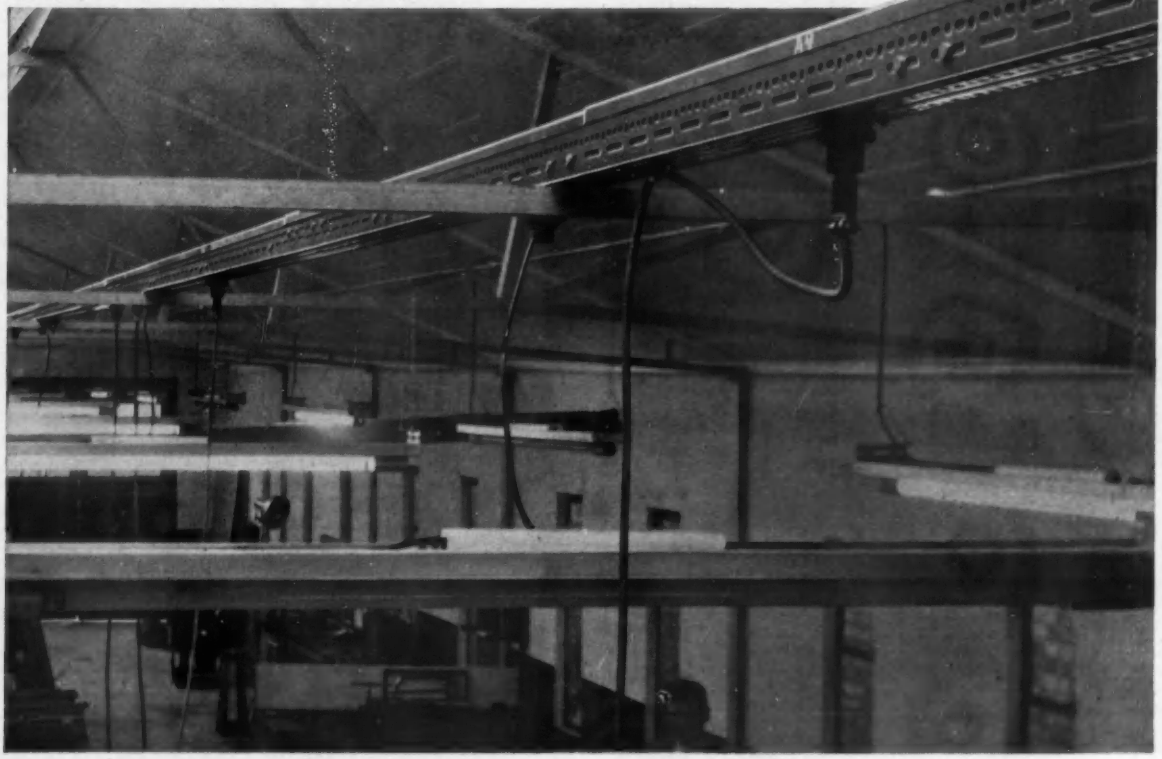
DEXION
REGD.
SLOTTED ANGLE

GET THE FACTS

Dexion 225 is sold in packets of ten 10-ft. lengths, complete with bolts. Steel Dexion (price from 1/3½ to 1/5 per foot) is rust-protected, stove enamelled. Where a light but strong, non-magnetic, non-corroding material is required, use Alloy Dexion (technical details and prices on request). New Dexion 300, fully interchangeable with other types, is larger in section (3″ × 1½″) — prices on request.

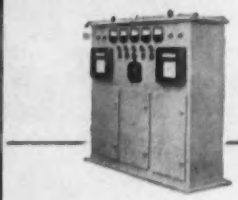
Dexion Service offers advice or design assistance on any problem, and construction teams are available. Send today for sample piece of Dexion and booklet AK 140 illustrating uses in many industries. Dexion Ltd., 65 Maygrove Road, Kilburn, N.W.6. (Telephone: MAlda Vale 6031-9.)

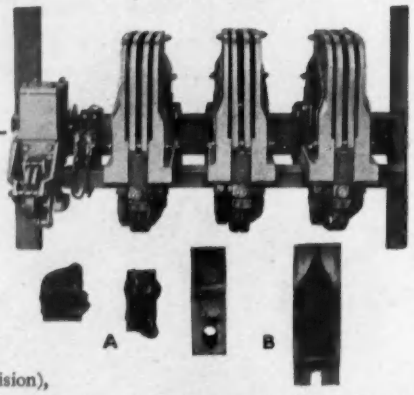
This effective cable trunking *was made quickly and cheaply by a light engineering firm, using Dexion. A similar system along the wall, also built at low cost, conveys power to every position in the factory.*



"These G.W.B. contactors have lasted well—much better than the previous copper ones"

An important industrial organization using hundreds of machine tools had control gear trouble on a machine working on heavy plug reversing duty. When this machine is set up it plug reverses 60/85 times for the first thirty minutes and then settles down to steady running. The machine in question is used for short runs so that the punishing setting up procedure might take place two or three times per day. Conventional type control gear with copper contacts required to have the contact faces cleaned with emery cloth every day, filed every three days and replaced after three weeks. **The G.W.B. contactor unit which replaced it showed only slight wear after ten weeks operation and was not touched during this period.**





G.W.B. CONTROL PANELS

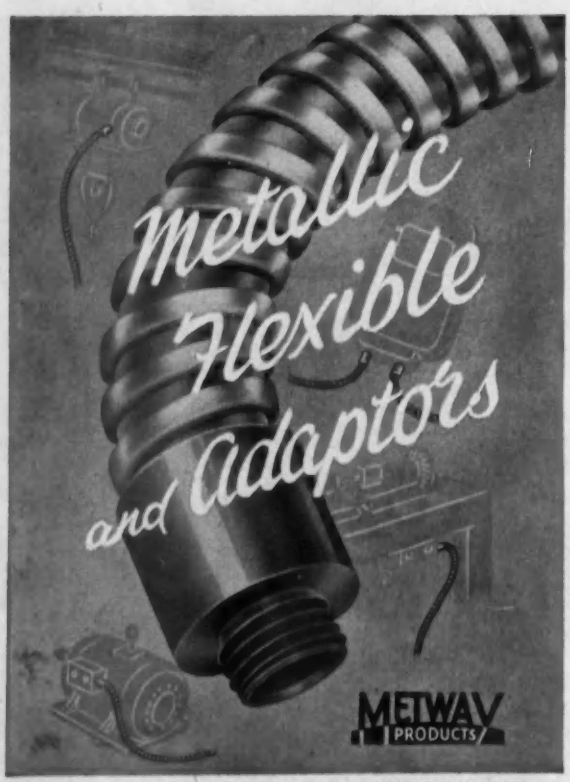
G.W.B. incorporate these special contactors in Control Panels of all types from simple units to complicated "tailor made" installations. In addition, G.W.B. offer complete design facilities and specialised advice for work of this description.

A are typical copper contacts after three weeks use.

B are the long life G.W.B. contacts with the sintered tungsten-silver contact faces after seven weeks use under precisely the same conditions.

GWB

G.W.B. FURNACES LTD. (Control Gear Division),
DIBDALE WORKS, DUDLEY, WORCS. Telephone: Dudley 4284 Telegrams: Gibwildbar, Dudley
Proprietors: GIBBONS BROS. LTD., and WILD-BARFIELD ELECTRIC FURNACES LTD.



Send for LIST No. OHL/31/E.T.

METWAY WORKS · Kemp Town · Brighton 7

DENSO
Industry's Protection against CORROSION

Whatever the conditions, all your cables and structural steelwork may be permanently protected by DENSO anti-corrosion products.

Non-hardening, DENSO not only ensures lasting immunity from corrosion but is ideal for temporary repairs also. It is the unfailing answer to corrosion problems for mains—cables—pipes—joints—in fact *all* your metalwork.

Write to us about any specific corrosion problems. We'll be happy to advise you without obligation.

DENSO ANTI-CORROSION PRODUCTS

Full information from:—
WINN & COALES LTD., DENSO HOUSE, CHAPEL RD., LONDON, S.E.27
Telephone: GIPsy Hill 4247/8 Telegrams: Denseite, Westnor, London

It's a good plan to specify

Maxheat

OVAL

TUBULAR ELECTRIC HEATERS

for better space heating

The World's best sellers

THE **Wardle** ENGINEERING CO. LTD., OLD TRAFFORD, MANCHESTER 16

Photo by permission of Elkington & Co. Ltd.

... Power for Purification at Elkington & Co. Limited's works is provided by 18 Davenset Glass Bulb Mercury Arc Rectifiers with separate oil filled Transformers controlled by Automatic Stepless Voltage Regulators.

This installation is used for the electrolytic refining of copper from scrap, and is typical of installations involving continued processes where dependability is of paramount importance.

RECTIFIER INSTALLATIONS DAVENSET

PARTRIDGE WILSON & CO. LTD., Davenset Electrical Works, Leicester

And now—

Copper Tubes from Kirkby

The whole range of I.C.I. copper tubes is now being made at Kirkby Works, near Liverpool—the largest copper tube mill in the British Commonwealth. Kirkby's main mill—more than seven acres under one roof—is the largest single production unit in the British non-ferrous industry and houses the most powerful tube-drawing machinery in the world.

I.C.I. copper tubes have long played a leading part in every branch of engineering. With the improved production methods at Kirkby, I.C.I. is able to offer even better service to industry at home and abroad.

COPPER TUBES for gas, water and waste services, radiant panel heating, locomotives' and ships' services, refrigerators, chemical and general engineering.

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1

ICI

ELECTRICAL ELEMENTS *for* ALL PURPOSES

GENRISTO
LTD.
OSMASTON STREET
NOTTINGHAM

SAX *Special*
ELECTRICAL EQUIPMENT

1. *Desk type Electrical Replacement Indicator*
2. *15 Amp Spring Hinged Cover Socket*
3. *Clock Plug Sockets*
4. *Rubber covered Plug Tops*
5. *Doctor's Illuminated Surgery Indicator*
6. *Desk type Push and Pilot Light Unit*

CATALOGUE FREE ON REQUEST

JULIUS SAX & CO. LTD. 24, COMMERCE RD. BRENTFORD. MIDDX
Telephone: EALing 0266 Telegrams: Saxtilla, Phone, Brentford, Hounslow

PVC *for yourself!*

INSULATE *with* HEDDOTAPE

The new P.V.C. Self-adhesive insulating tape available in 6 colours in widths of ½" upwards.

★ ONE layer equals many of old-fashioned black cotton tape.
★ GREAT dielectric strength (10,000 volts) yet wafer thin.
★ HIGH resistance to oils, acids, moisture and corrosion.
★ HIGH adhesive strength provides perfect insulating seal even under extreme temperatures.
★ HIGH elasticity conforms to all surfaces.
★ SMOOTH plastic surface gives perfect finish.

HEDDOTAPE is a product of the Heddon-Smith Group of Companies

Manufactured by

HEDDESCO LTD.

Heddonia House, 374, Euston Road, London, N.W.1
EUSton 8501 (6 lines)

D/HDL/2172

Volex

. . . and designed according to his requirements

13 amp. SOCKETS

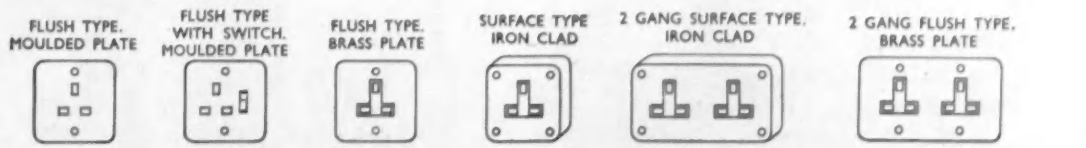
MOULDED and METAL PLATES

TO B.S.S. 1363

This 13 amp. range has been designed and produced only after extensive research into the requirements of the Electrical Contractor.
The conveniently placed terminals which are mounted on a ceramic base amply accommodate 7/.029″ looped cable and an additional 7/.029″ spur.
Flush plates have standard 2¾″ fixing centres which enable them to be fitted to standard B.S. 1299 boxes.
The Switch movement incorporated in the Switch Socket has been subjected to extremely severe tests and is capable of carrying and breaking a 75% overload.

FINISHES:

Moulded Plates : Brown or Cream.
Brass Plates : B.M.A. (Standard), Chrome, Satin Chrome, etc.
Surface Types :
1. B.M.A. Plate (Standard), Chrome, Satin Chrome, etc.
2. Metal clad. Steel Plate, Finished Grey enamel (Standard), Black enamel, etc.


FLUSH TYPE. MOULDED PLATE
FLUSH TYPE WITH SWITCH. MOULDED PLATE
FLUSH TYPE. BRASS PLATE
SURFACE TYPE IRON CLAD
2 GANG SURFACE TYPE. IRON CLAD
2 GANG FLUSH TYPE. BRASS PLATE

Volex VOLEX ELECTRICAL PRODUCTS LTD
SALFORD 6

Telephone: PENdleton 4373 Telegrams: "VOLEXPROD", Salford 6

R.E.A.L.

AND NOW - another record PLINTH sales season...

WITH A PERFECT WRAP IN A PERFECT PACK TO HELP YOU!

Each R.E.A.L. Plinth is proofed against moisture and dust by a pleated cellophane wrap that permits full inspection and handling before purchase, and maintains the immaculate condition of the Plinth itself. Now the standard method of dispatch, these rail certified containers hold 12 Plinths of a size, in a colour assortment that mirrors the public demand: 6 Pastel Cream, 2 Gilt Lustre, 2 Eggshell Black, 1 Pastel Rose and 1 Pastel Blue. This is our recommended assortment but, of course, any selection can be supplied. Broken quantities carriage extra, plus part cost of packing.

The R.E.A.L. Plinth 11½" dia. at base
List No. 5000 **36/9d.** each including P.T.

The Junior Plinth 6" dia. at base
List No. 5002 **28/-** each including P.T.

Patent No. 659,876

Specially appointed distributors are carrying stocks in every part of the Country.

NATIONAL ADVERTISING

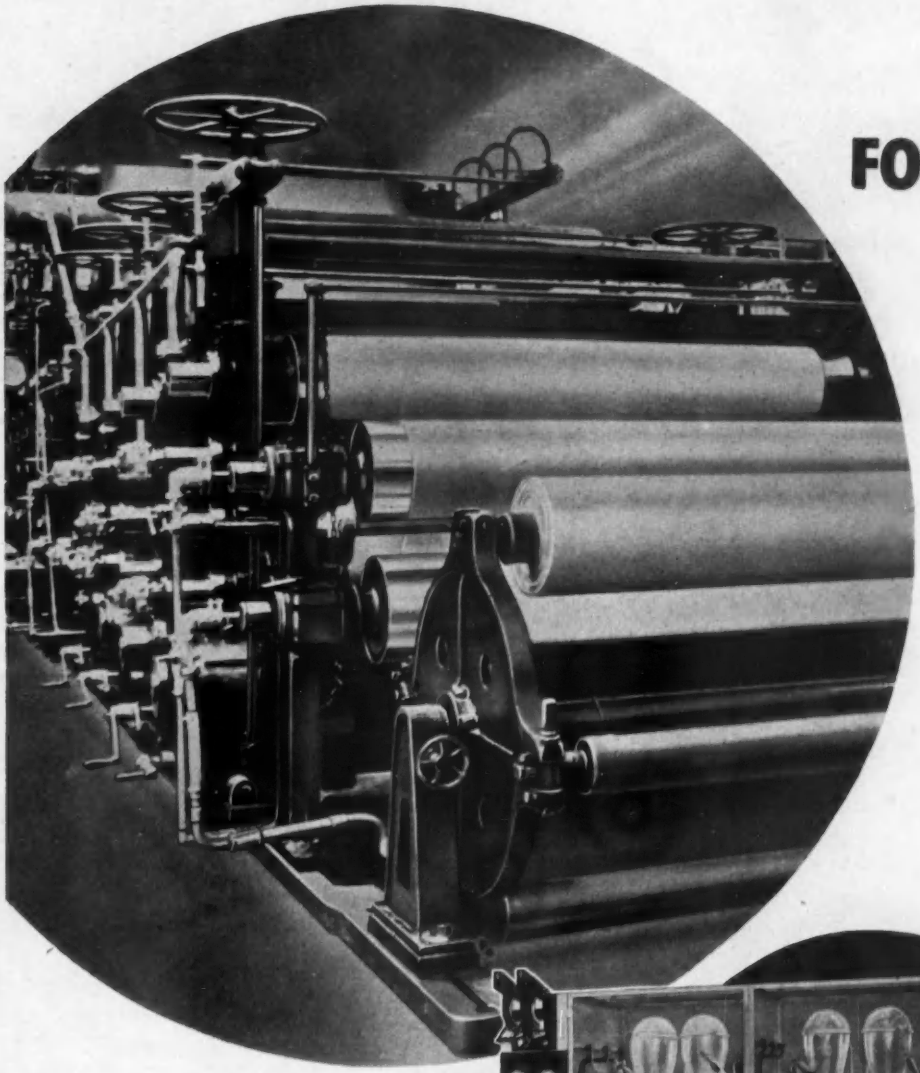
Watch for our announcements in these journals

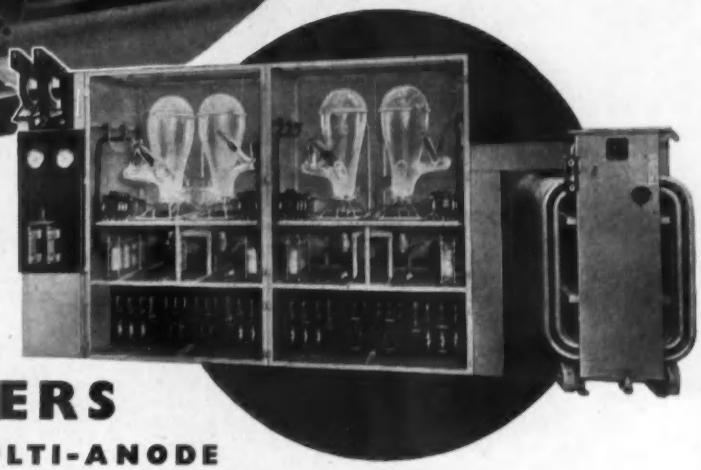
ESQUIRE
EVERYBODY'S
FINANCIAL TIMES
HARPER'S BAZAAR
HOMES & GARDENS
HOUSEWIFE
IDEAL HOME
JOHN BULL
THE LADY
PICTURE POST
PUNCH
RADIO TIMES
TIT BITS
T.V. MIRROR

and many National Daily Papers.

Issued by Rowlands Electrical Accessories Ltd., R.E.A.L. Works, BIRMINGHAM 18

FOR D.C.-





Nevelin

RECTIFIERS

SINGLE OR MULTI-ANODE

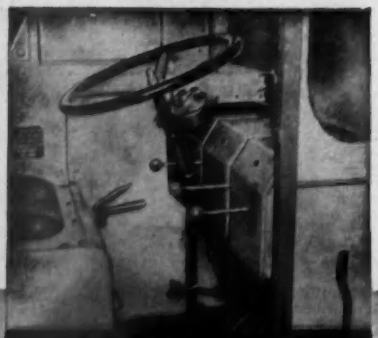
Nevelin multi and single-anode rectifiers are extensively employed in the Papermaking and Printing Industries. In addition to a wide range of standard equipments, specially designed installations working in parallel with steam driven plant, and Varionic Adjustable Speed Drives operating direct from A.C. Supplies, have been installed in many mills. *Whenever there is an industrial need for D.C., Nevelin's specialized knowledge of Mercury Arc Rectification is readily available on request.*

NEVELIN ELECTRIC CO. LTD · PURLEY WAY · CROYDON · SURREY

A LANCASHIRE DYNAMO GROUP COMPANY

NR6

D



COLES HALVE THE TIME.. DOUBLE THE EFFICIENCY

TOP MARKS.. FOR SIMPLICITY OF OPERATION

YOU, SIR! Yes, *you* . . . could lay aside this magazine and after just 30 minutes instruction could operate a Coles Crane. Not like an expert, perhaps, but control it none the less, and if that isn't saying how easy it is . . . well!

It's like this, you see; all the controls are grouped together for easy finger-tip operation, there's no clutch or gears to confuse matters and the crane controllers have a spring return which halts motion instantly you release pressure. Then there is the fully automatic reversing steering mechanism, which is a technical way of saying that no matter what the relative position of the crane cab and chassis, the travel steering is 'natural'. And if you should feel that a big 20-ton lorry-mounted Coles is a bit beyond your capacity, you'd be wrong again, because they all have power-assisted steering which means that even on rough ground you can steer the vehicle with one finger. It all sounds easy . . . like to try it ?*

* *Demonstrations can be easily arranged. Coles cranes are manufactured in a wide range of lifting capacities up to 92,000 lb. Also available are "Electric Eel" Industrial Tractors. Please write for details.*

★ Among the many other advantages of Coles cranes which make for absolute simplicity of operation are :—

A full-vision cab, giving perfect visibility. Several safety devices which are built in as integral parts of the system. The ability to operate each motion individually or in combination and to slew full circle in either direction without limit. Safe, controlled lowering of loads under power, NOT just against the brake. The electric transmission system, which makes possible infinitely variable speeds with positive control and saves power by obviating gear trains.

These are but a few of the reasons why there are more Coles mobile cranes in service today than any other type. For the Coles is the crane with clear advantages from everyone's point of view, be he owner, operator, or maintenance man. It's worth thinking about before you buy a mobile crane.

Designed, manufactured and marketed by

STEELS ENGINEERING PRODUCTS LIMITED

Machinery Department

CROWN WORKS • SUNDERLAND

Telephone: Sunderland 56281 (10 lines). Telegrams: Steel, Sunderland.

SALES & SERVICE:—

Birmingham: 39 Thorp Street, 5 • Glasgow: 235 Bath Street, C.2
London: 6 Avonmore Road, W.14 • Manchester: 153 Oxford Road, 13
Newcastle: Brunswick House, Brunswick Place

COLES

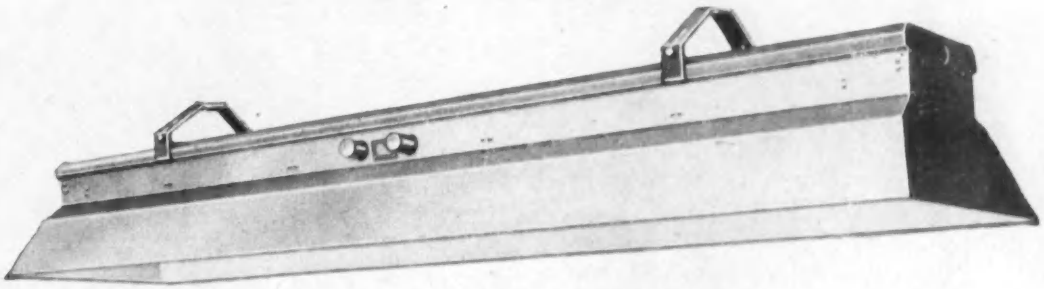
THE NAME THAT CARRIES WEIGHT

For clean, dry conditions say

PEROPAL REGD

FLUROLIER FITTINGS

the finest reflector finish of its kind



There's no doubt about it—'Peropal' is the most durable, most reliable reflector-finish of its class on the market. In the full standard Benjamin range of Flurolier fittings, the 'Peropal' finish has been specially developed for light industrial use. Finished white inside and out, 'Peropal' provides usual easy maintenance and wide variety of installation facilities at competitive prices. Sound lighting deserves sound advice on installation.
Write for further information.

BETTER LIGHTING BY

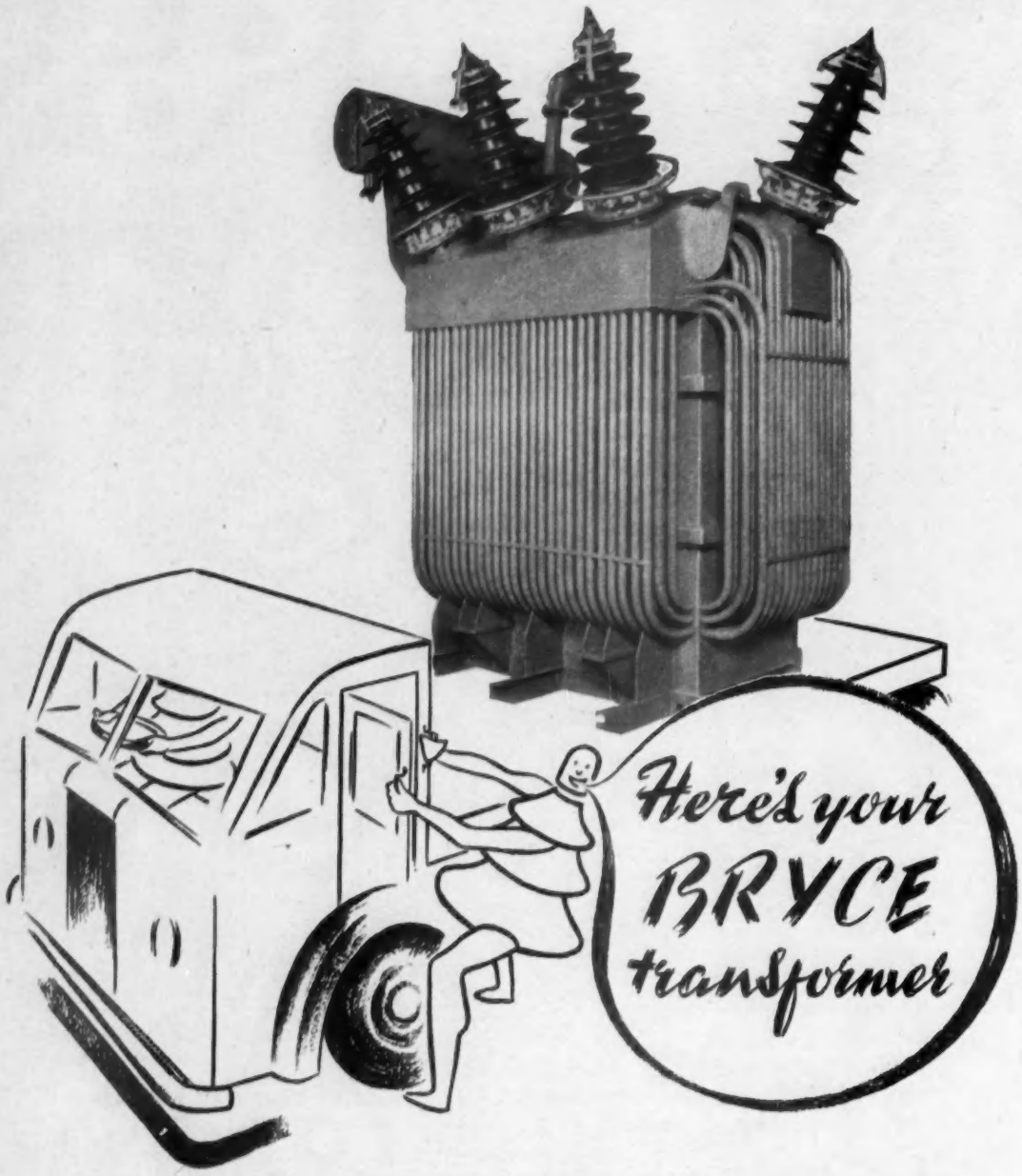
BENJAMIN REGD.

THE BENJAMIN ELECTRIC LIMITED · TOTTENHAM · LONDON · N.17

Telephone: TOTtenham 5252 (5 lines) Telegrams: "Benjalect, Southtot, London."

BIRMINGHAM: 5, Corporation Street, Birmingham, 2. Tel. MIDLAND 5197. LEEDS: 49, Basinghall Street, Leeds, 1. Tel. LEEDS 25579

Smee's 2/55



We are proud to see our Transformers leaving the Works; prouder still when they are installed and giving the service we expected of them. Why? Because we know that they are of solid construction, built from the finest materials available and will give dependable service for many years. Consult BRYCE before ordering Power Transformers and you too will be more than satisfied.

BRYCE ELECTRIC CONSTRUCTION COMPANY LTD.

KELVIN WORKS • HACKBRIDGE • SURREY

WALLINGTON 2601/4

In association with HACKBRIDGE CABLE COMPANY LTD.

Never Stronger

The Cable Makers Association has never been stronger. It has been concerned in all major advances in cable making during the 55 years it has been in existence. Much remains to be accomplished. The C.M.A. is ever conscious of its responsibility for supplying high quality cables to the world, in fostering fruitful channels of communications in research amongst its 17 members and also to the many government sponsored and other important technical committees on which C.M.A. members serve.

Technical advice concerning cables will be freely given and the C.M.A. will gladly put you in touch with suitable manufacturers.

Insist on a cable with the C·M·A label

MEMBERS OF THE C.M.A.

British Insulated Callender's Cables Ltd · Connollys (Blackley) Ltd · The Craigpark Electric Cable Co. Ltd. Crompton Parkinson Ltd · The Edison Swan Electric Co. Ltd · Enfield Cables Ltd · W. T. Glover & Co. Ltd. Greengate & Irwell Rubber Co. Ltd · W. T. Henley's Telegraph Works Co. Ltd · Johnson & Phillips Ltd. The Liverpool Electric Cable Co. Ltd · Metropolitan Electric Cable & Construction Co. Ltd · Pirelli-General Cable Works Ltd. (The General Electric Co. Ltd.) St. Helens Cable & Rubber Co. Ltd · Siemens Brothers & Co. Ltd. (Siemens Electric Lamps & Supplies Ltd.) Standard Telephones & Cables Ltd · The Telegraph Construction and Maintenance Co. Ltd.

The Roman Warrior and the letters 'C.M.A.' are British Registered Certification Trade Marks.

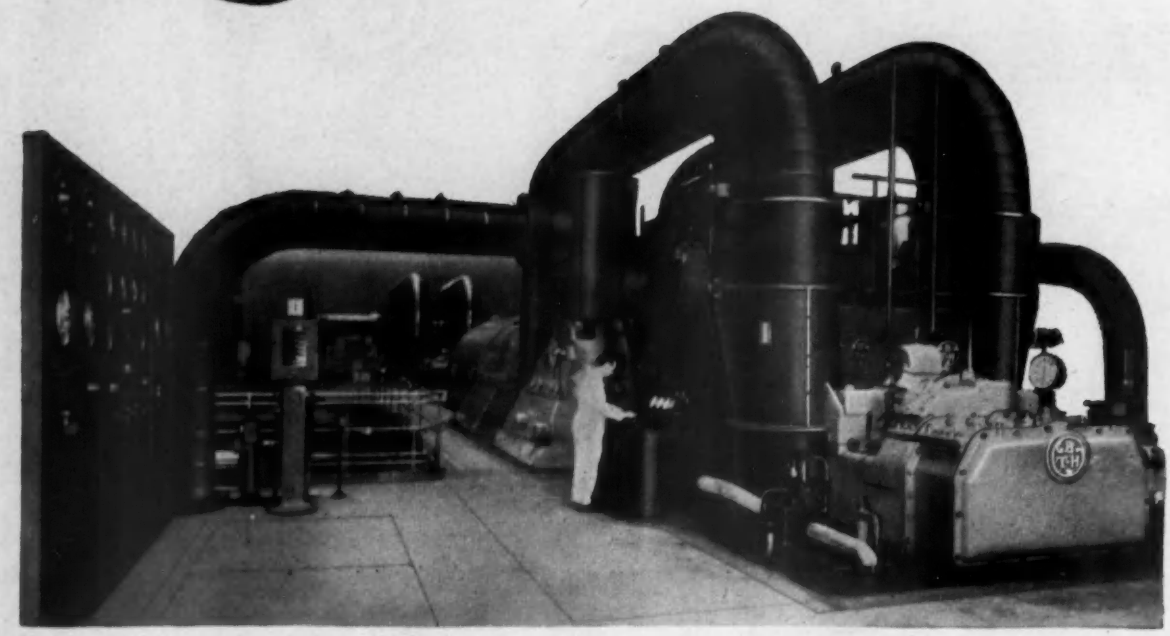
CABLE MAKERS ASSOCIATION, 52-54 HIGH HOLBORN, LONDON, W.C.1 Telephone: Holborn 7633

CMA/1

Shift Operation

of

TURBO-ALTERNATORS



Bankside 'B' Power Station

Two 60,000-kW, 2-cylinder, 3,000-r.p.m. BTH turbo-alternators installed in this C.E.A. Power Station in London have demonstrated in remarkable fashion the suitability of the design to meet the most severe shift operating conditions. Indeed, on many occasions these machines—which operate under steam conditions of 900 lb. per sq. in. g. at 900°F—have been run up and shut down twice in one day.

No. 1 Set has been started up and loaded 539 times in 2¼ years.
No. 2 Set has been started up and loaded 486 times in 1¾ years.

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED · RUGBY · ENGLAND

Member of the AEI group of companies

A 4903

WARM-GLOW does it again!

THE NEW WARM-GLOW POPULAR range starts with the 50" x 28" JUNIOR at 63/- retail, tax paid, to the 60" x 50" DOUBLE at 119/6 featuring the remarkable NEW WARM-GLOW 2-pole cord-switch, neon illuminated, 100 lb cord-grip, and lovely NEW coloured display boxes to take your breath away.

Prices from 63/- to £19-0-0

The WARM-GLOW 'VIGILUX' is The Rolls-Royce of Electric Blankets. It has all the luxury features of The WARM-GLOW de Luxe range below, lovely large woollen blankets, beautiful pastel colours, waterproof elements, safe when wet, and washable at home, but plus the patented infinitely variable illuminated bedside control, the only control which can be set to *any* temperature, and is self compensating: prices from £11.3.3 to £19.0.0. The well-known WARM-GLOW de Luxe Single Heat range, priced at £8.5.0 to £14.5.0 this year has the NEW illuminated 2-pole cord-switch.

"VIGILUX" ELECTRIC BLANKET
with finger-tip bedside control. Pat. No. 671239

SINGLE HEAT de Luxe ELECTRIC BLANKET
Pat. No. 445195

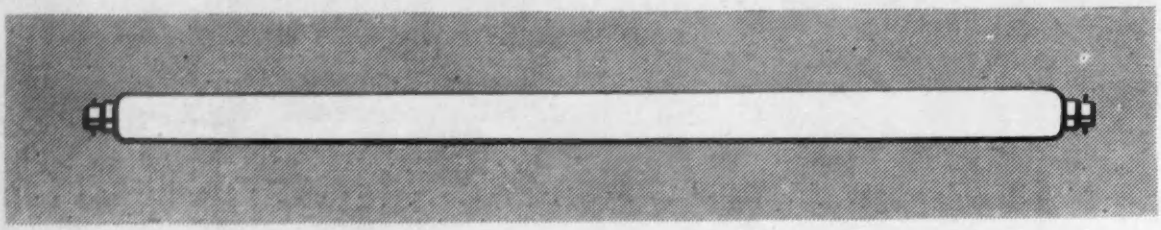
ADVERTISEMENTS ARE APPEARING REGULARLY THIS AUTUMN AND WINTER IN THE DAILY EXPRESS, DAILY MAIL, DAILY TELEGRAPH, NEWS CHRONICLE, TIMES, SUNDAY CHRONICLE, SUNDAY DISPATCH, EVERYBODY'S, ILLUSTRATED, PICTURE POST, PUNCH, etc.

★ also
WARM-GLOW
SOIL HEATERS
PIPE HEATERS
PIANO HEATERS
WINDOW DE-MISTERS
Leaflets on request ★

ASK YOUR WHOLESALER FOR FURTHER DETAILS OR WRITE TO DEPT. E.7

The WARM-GLOW Co LTD · LEIGH-ON-SEA · ESSEX · ENGLAND
Telephone · EASTWOOD · 55742 Telegrams · WARMGLOW · LEIGH-ON-SEA

divide



your light bills

The reduction of maintenance costs is an ever-present problem in industry, and dependable equipment makes a valuable contribution towards lowering these costs.

Reliability in lighting is no less important than reliability in other production tools.

With the Osram tube, freedom from early failure and the highest possible efficiency during life together give an overall performance which cannot be bettered.

with Osram fluorescent tubes

A G.E.C. product. The General Electric Co. Ltd.

ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY, 6 OCTOBER, 1955
Volume No. 128 Number 3335
REGISTERED AS A NEWSPAPER

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telegrams: Equivolt, Estrand
Telephone: HOLborn 6016

Editor and Managing Director:
ROY BALDWIN, M.I.E.E., Barrister-at-Law

Assistant Editors:
J. K. JOHNSON, B.SC.(ENG.), A.M.I.E.E.
E. C. POUNDS, B.SC.(ENG.), A.C.G.I., A.M.I.E.E.

In This Issue

Transmission Reinforcement for the South, by *A. W. Sweetinburgh*, A.M.I.E.E. A.M.C.T. 511

Report from New Zealand 515

Comparative Merits of 50 c/s 25 kV Traction 516

Seventh Year Survey 517

Area Board Progress 518

Notes on Wiring, by *Megohm* 521

Coal Direct from Colliery to Bunkers ... 522

Shunting Locomotive Design 526

Smoke Abatement Conference 526

Process Control Systems 527

Overseas News 528

Personalities in the Industry 530

Equipment for Industry 532

For the Electrical Trade 533

Problems and Practice in Engineering ... 535

News of the Week 536

Electric Supply News 541

Company Activities 542

Commercial Information 543

Classified Advertisements 63

Index to Advertisers 70

SUBSCRIPTION RATES

United Kingdom and Overseas £3. 1s. 0d. per annum. Canada $9. U.S.A. $9 per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque, international money order, or by UNESCO book coupons. Single copies price 1s. each.

E

COMFORT AT A COST

The Government's acceptance of the principal recommendations of the Beaver Committee has brought within reach the main objective for which the Smoke Abatement Society has fought over the years. Inevitably, the principal subject of discussion at its Bournemouth Conference last week was the Clean Air Bill which will soon be under debate by the House of Commons, and delegates looked ahead to the ways in which local authorities will use the powers which the Bill seeks to confer. Smoke-control areas set up under the Bill are going to involve these authorities in much advisory work on house heating, and recruitment and training of officers to give that advice will not be easy. There is a need for the electrical industry to ensure that its expert advice is readily available to the right department of the local council, to point the merits of the cleanest of all heating techniques. "There are complaints about the cost of coke" said one speaker at the Conference, describing experience in an existing smokeless zone, "many tenants stating that they have to spend more on fuel in their new houses than they did in the old." He went on to qualify this by saying that most users appreciated that they obtained more value for the increase in expenditure: but this complaint is a common result of the inflexibility of the more complicated "improved" methods of solid fuel appliances which compliance with smoke control areas will demand. Time and again solid fuel methods dictate to the user the standard of comfort he must accept. Electricity can satisfy the basic clean air requirements better than any form of solid fuel appliance, and its outstanding characteristic of flexibility goes far to offset its apparent cost disadvantage in terms of pence per gross therm released. Plans should be under consideration now to ensure that the relevance of electricity to smoke control will be widely publicised when new powers become practical local politics some time next year.

DETAIL FROM THE DISTRICTS

Annual reports of the area boards quite rightly differ widely one from another in form and content. Only the ministerially prescribed details of accounts and statistics provide a unifying note—elsewhere something of the personality of the full-time Board members moulds the matter contained and its manner of presentation. Our editorial instinct is to welcome the fullest possible information, and to deplore the comparative aridity of the story some of the boards produce, but we have an additional reason for singling out for mention

the South Eastern Electricity Board's report, always one of the fullest. In this, an important step forward has been taken by the inclusion of an appendix to the report surveying briefly the work of the each individual district of the board. Regular readers are familiar with our continued insistence on the essential importance of work at district level, and on the part that can be played by encouraging the spirit of competition between districts. Inclusion of district reports in the Board's principal document of the year is an encouraging recognition of this importance, and we commend to other Boards this move. But welcome though the experiment is, it still falls short of the detailed record of district's costs and sales statistics which is necessary and desirable as the basis of a comparison of district efficiency.

INSTITUTION PROSPECT

The presidential address which Sir George Nelson delivers at Savoy Place this evening will launch the 85th year of the I.E.E. The programme arranged contains the usual selection of interesting topics for all persuasions of electrical engineer, and in the coming months we shall be summarising for readers the more interesting points that arise in the presentation and discussion of this mass of technical information. It seems appropriate, then, to set the scene before the action commences, for this year there are as usual a few changes from familiar previous practice. The main domestic alteration is a recognition of the wider interests of the Measurement Section by adding the words "and Control" on to its title. This section thus takes another step away from its down to earth days as the Meter Section; today it must rival the Radio and Telecommunication Section (also extended in title) for the amount of higher mathematics which complicates the records of its proceedings. The biggest change in organisation comes outside the confines of the Institution alone, however. It is the new experiment in inter-society co-operation, the British Nuclear Energy Conference. Whatever the success of this venture in obviating the need for some new association of nuclear technologists, it should have a consolidating influence on the existing policy of closer identification of the senior engineering institutions in many matters of common interest. Amongst these changes, however, the first half-session programme shows one unwelcome feature to remain. This is the comparative lack of papers describing in detail electrical engineering projects carried through from beginning to end. Such papers not only give useful information on current techniques; almost invariably they spark off useful critical discussion. The Institution has in the past encouraged this type of paper. Why is it that potential authors will not respond?

PROCESS CONTROL PROBLEMS

Following the conference on "Automation," with its wide publicity, the recent one on "Automatic Control in the Process Industries," held jointly by the Society of Instrument Technology and the Institution of Chemical Engineers, is unlikely to attract the general public. Yet it was at this latter meeting that some of the more fundamental technical problems were raised. Possibly the most significant point was the general acceptance that complete integration between control and process is not only desirable but necessary. Hitherto the engineer has called on his control and instrumentation colleagues to provide the equipment to carry out certain specific functions. Now the complexity and speed required and the number of dependent variables involved have made this attack unacceptable. The evolution of a firm theoretical basis on which the matching-up of a process plant and its associated system can be founded is a complex problem yet awaiting solution. Such a solution can be brought closer by the use of modern computing techniques. Indeed one paper went so far as to visualise the computor as an essential integral part of future control systems. Already in the oil industry the process analyser is in operation and in the services computing mechanisms are widely used. If, as the President of the Institution of Chemical Engineers suggested in his address, a ready exchange of information could be arranged, industrial progress would greatly benefit.

TWO-STAGE HEATING

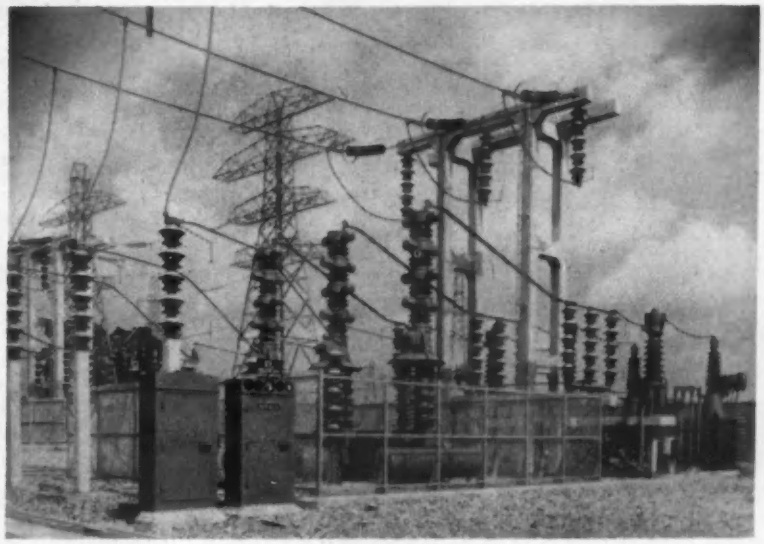
Growing interest in electric house heating is a feature of the U.S. supply industry at present. Sharply increased summer loading from air-conditioning equipment has given domestic heating the favourable character of improving annual load factor. But whatever the year-round load effects of this type of demand, the desirability of minimising the daily system peak remains, and various stratagems for controlling electric heating to this end have been described in our American contemporaries. One which recently attracted our interest in *Electrical World* seems an extension of cooker practice in the use it makes of 120/240 V three-wire supplies. During the peak, the 240 V connection is switched off by time switch from the heating installation, so that this can only operate at half load. This complicated approach is claimed to leave consumers happy with their cuts.

APPRENTICESHIPS IN DEMAND

Post-graduate engineering apprenticeship courses are available in British firms covering a wide range of products and size, and the net is cast wide to attract students to this advanced training. Yet there is still pressure from abroad for more opportunities for foreign students to have the advantage of these courses. The latest evidence of this came last week in a Press conference held by British Ambassadors home from middle east oil countries. Two of the Ambassadors suggested that so seriously was the position viewed by the Governments of the countries concerned, that they were willing to finance any students who could obtain apprenticeships in this country. In some ways this seems a strange situation to arise when it is recalled that the F.B.I. offers scholarships to encourage apprentices from overseas, but it must be remembered that there is a limit to the number of foreign students acceptable. Also, the standard of technical knowledge required to benefit from an apprenticeship course is itself not easily assured. None the less, this authoritative expression of opinion should lead firms operating suitable schemes, particularly perhaps the less large concerns, to look again at the possibility of expansion with the particular object of filling this unsatisfied overseas demand.

Meteor

Switchgear for 132 kV installed at Elstree



Transmission Reinforcement for the South

ELSTREE 275/132KV GRID SUBSTATION NEARS COMPLETION

By A. W. SWEETINBURGH, A.M.I.E.E., A.M.C.T.*

ONE of the most important interconnecting points between the new 275 kV Superimposed Grid and the existing 132 kV transmission system of the Central Electricity Authority is located about 2½ miles South-West of Elstree. This switching and transforming station will form the southern terminal of the two 275 kV circuits from the Trent Valley and lies on 275 kV connections to be established round London from Tilbury in the East, via Elstree, to Iver and West Weybridge.

The Elstree station, which lies within the area of the Eastern Division, is being engineered by the Authority's staff. Selection of this site was largely influenced by the fact that transmission lines passing nearby could be re-arranged to form eight interconnectors, each of 90 MVA capacity, between the new 275 kV system and major generating stations and distribution centres in the North Thames Control Area of the existing 132 kV system.

When the desired location of this major station on the system had been decided, the Authority's engineers and negotiators were confronted with problems of some difficulty and delicacy connected with the acquisition of the site and the securing of numerous wayleaves for the new 275 kV lines and the re-arrangement of the existing lines. Further, it was, of course, necessary to accommodate the conflicting interests of certain of the Services, Ministries and other statutory bodies.

System Connections

As at present under construction, the 275 kV substation is laid out to control two circuits to Staythorpe, Notts, and two to Iver, Bucks. The new double circuit line to Tilbury, which is also of 275 kV construction, will be operated at 132 kV until a 275 kV substation has been established at Tilbury. The layout of the 275 kV substation allows for the subsequent transfer of these circuits.

Four 275/132 kV interbus transformers are being installed initially, and provision is made for two additional transformers. These will all be auto-transformers of 120 MVA provided with on-load tap changing facilities.

As planned, the 132 kV connections will consist of two feeders to Watford-teed-Hemel Hempstead, two feeders to Watford-teed-Harrow, two feeders to Brunswick Wharf-teed-Brimsdown and two Rye House feeders-teed-Hatfield, together with the temporary 132 kV feeders to Tilbury.

Site Arrangements

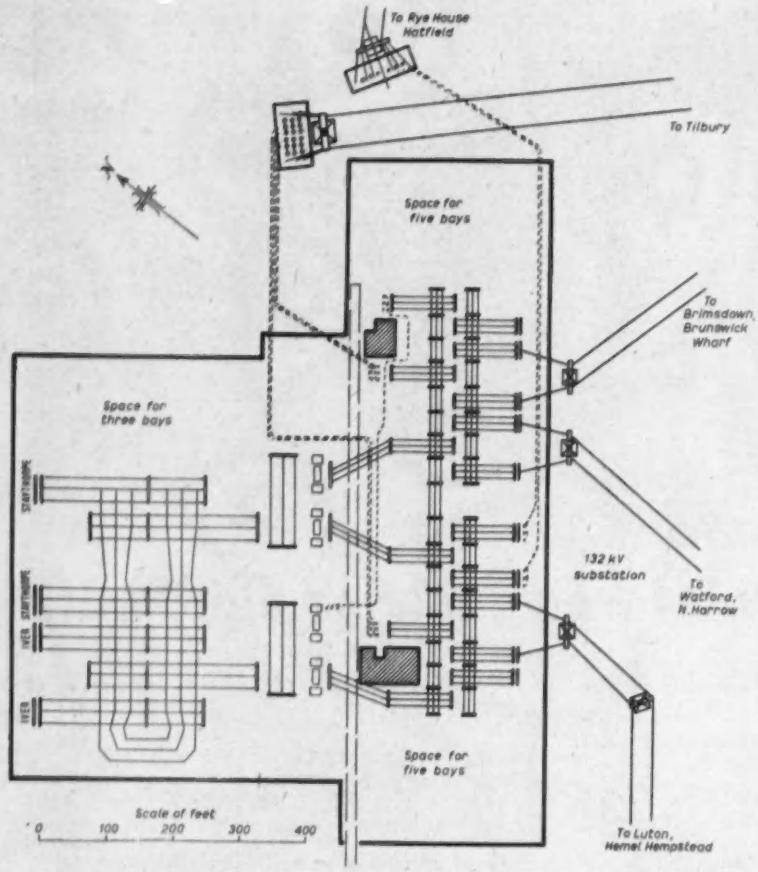
To ensure freedom in the layout of the many transmission line entries, it has been necessary for the Authority to purchase a considerable amount of the surrounding land, part of which, however, will be made available for agricultural purposes. The site is surrounded by a wall formed of concrete blocks. This type of enclosure was decided in consultation with the Planning Authority. In order to preserve local amenities as far as possible, arrangements have also been made in consultation with the Planning Authority to plant trees wherever possible.

The 275 kV and 132 kV substations are separated by the main site access road. In both cases the busbars run approximately North-East to South-West, the 275 kV switchgear lying to the North-West of the access road. The Staythorpe and Iver lines will enter the 275 kV substation on its North-West side, as also will the Tilbury lines eventually. The latter, however, while in commission at 132 kV, and also the Rye House 132 kV lines, will be connected to the switchgear by underground cables.

Structural Features

All the electrical equipments and the aerial connections for both the 275 kV and 132 kV substations, are carried on reinforced concrete structures. This type of construc-

* *Mr Sweetinburgh recently retired from the Eastern Division.*



General plan of site to show arrangement of busbars and switchgear

tion was selected in order to economise in steel and reduce maintenance costs by avoiding the necessity for painting. Before undertaking the detailed design of the station, a prototype of the heaviest typical structure was erected on this site and tested to destruction to verify design factors. As the civil works contractor was required to fabricate the reinforced concrete structures on site, a casting bed was laid out for this purpose. The main vertical elements of the structures were formed in the moulds and after the maturing period, were erected in mass concrete foundations and united by cast-in-situ work to form the main horizontal supporting elements.

The connections from incoming overhead line circuits terminate on structures which also receive the main aerial cross-connections, and in certain cases support the main isolators. In the case of the 275 kV equipment, these structures are approximately 43 ft high, while those for the 132 kV line entries are 33 ft. All lofty reinforced concrete structures are provided with permanent ladders fixed to vertical members to facilitate maintenance. The switchgear proper, and busbar connections are supported on suitable structures at lower level.

Both the 275 kV and 132 kV substations have duplicate busbars. The interbus transformers are banked in pairs, each pair being controlled by a single 275 kV circuit-breaker, but switched separately on the 132 kV side. Each pair is arranged to straddle the 132 kV bus section switch and to achieve this, it has been necessary to complete one set of 132 kV connections by cable.

Auxiliary Plant

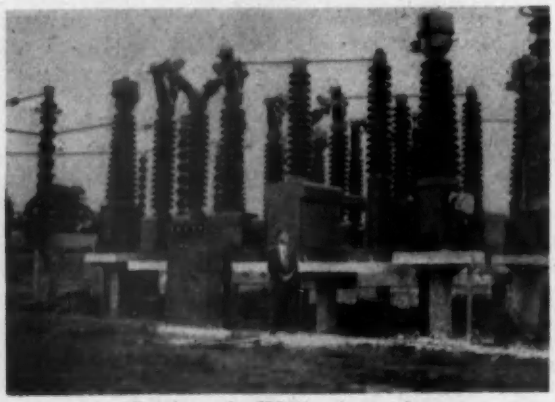
There are two buildings, each containing auxiliary plant including air compressors, batteries, protective equipment and other items. The equipment in each building is arranged for the operation of half of the 275 kV and half of the 132 kV switchgear installations. Emergency inter-connectors are provided between the battery, compressor and auxiliary supply equipments in each plant building. These arrangements are designed to secure continued limited operation of both substations with interbus transformer connections in the event of serious failure of main or auxiliary equipment.

275 kV Switchgear

The circuit-breakers for the 275 kV side of the substations are of the air-blast type of 7,500 MVA rupturing capacity and each breaker consists of three single-phase units. Each single-phase equipment has three circuit-breaking units with pairs of interrupters mounted on separate insulated blast columns connected in series externally as shown on p. 513. The single-phase switching is completed by an external series contact arm which is designed for isolation on "trip" and also to "make" on the closing operation. The interrupters include main current carrying and arc control contacts.

The moving contacts are mounted on spring-loaded pistons which move when the air pressure rises to a predetermined value, so separating the contacts. Springs ensure a quick return of the contacts to the closed position when the blast pressure is removed.

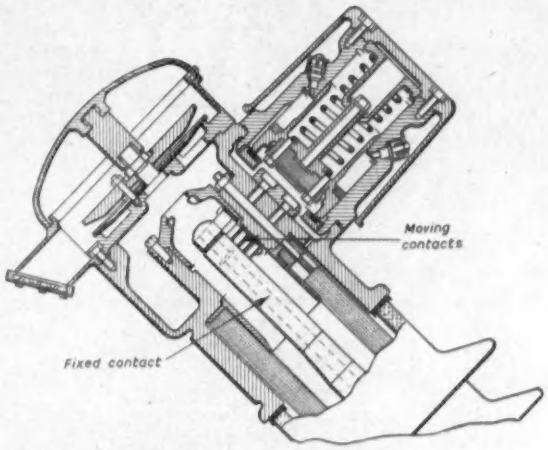
Capacitors of suitable value are built into the interrupters to control the voltage distribution during circuit-breaking. These take the form of tubular bakelised paper capacitor insulators, which also serve to conduct the blast of air to the moving contacts. The series contact arm rotates in a horizontal plane and is mounted on a vertical insulated torque shaft centrally disposed on a welded steel bed-plate.



Switchgear for 275 kV under erection

A separate local air receiver which can be isolated from the system is provided for each single-phase equipment. The capacity of this receiver is sufficient for successive break-make-break operations at full short circuit rating. The circuit-breaking and exhaust housing is totally enclosed and weatherproof, the exhaust valves being normally closed to retain the conditioning air and to prevent ingress of atmospheric air.

Contacts and moving parts are readily accessible as the moving contact assembly may be removed complete without interfering with any other part of the circuit-breaker,



Arrangement of the 275 kV interrupter head

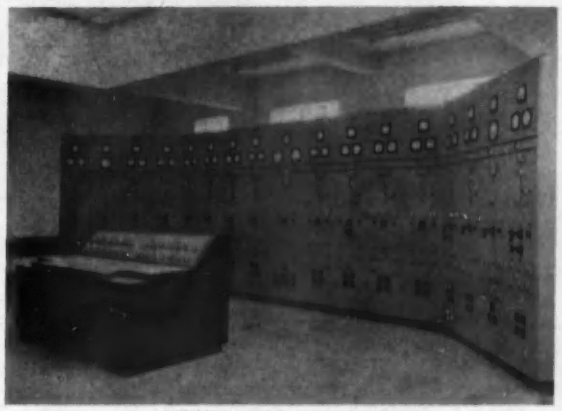
and the associated fixed arcing electrode and nozzle may then be inspected.

In the individual single-phase equipment, a 3-stage electro-pneumatic tripping valve controls the opening of the three associated blast valves, which are mechanically coupled. When the trip coil is energised it opens the first stage of the tripping valve and so allows high pressure air from a local air receiver to open the second and third stages to drive the piston of an air-motor which operates the blast valve shaft and opens the three blast valves. The associated series contact arm is then opened by a second air-motor and a changeover valve transfers pressure to the other side of the first air-motor piston, so closing the blast valves. Cutting off the air supply allows the interrupters to re-close. It should be noted the air-motor mechanisms for all phases are inter-coupled mechanically, so ensuring simultaneous three-phase operation. Re-closure of the circuit by the external series contact arm is effected by a second three-stage electro-pneumatic valve.

Dry air at slightly above atmospheric pressure, obtained by expansion of compressed air from a ring main pipe-line, is continually circulated through the blast pipe and circuit breaking portion of each phase to maintain the internal insulation in good condition. Indicators are fitted to each circuit-breaker to facilitate the checking of the flow of conditioning air—a factor of great importance.

Compressor Plant

There are two compressor rooms containing four three-stage air-cooled compressors which supply air to main receivers situated adjacent. Working pressure of the air at both 275 kV and 132 kV switchgear is 350 lb/sq in. but in order to obtain the requisite dryness the air is compressed to and stored at 600 lb/sq in. in the main air receivers. Each set of compressors supplies operating and conditioning air by means of ring main pipework systems for half of both the 275 kV and 132 kV switchgear.



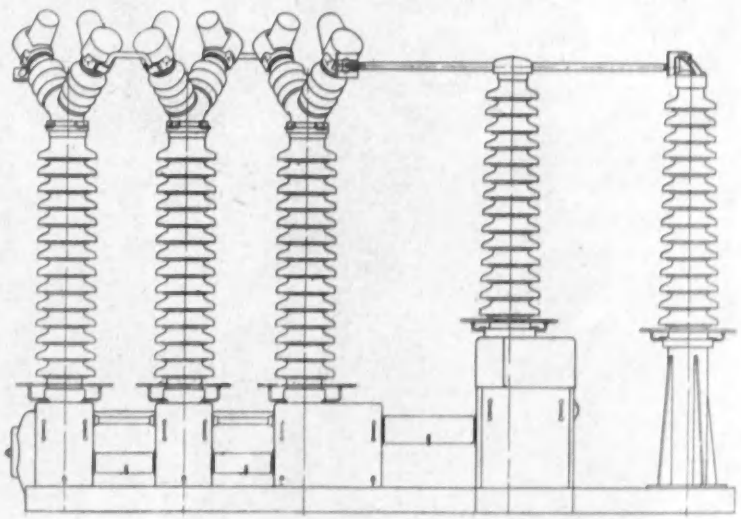
132 kV board in control room

A control panel is provided in each compressor room accommodating shut-down and isolating valves, oil and water filters and compressor motor control gear, etc. A diagram of the compressor room connections and the ring main system is incorporated in this control panel. Adjacent to each panel is a separately mounted valve bank for controlling the air supplies to the ring main system. Intercoolers are provided on the compressors and the air is further cooled after compression.

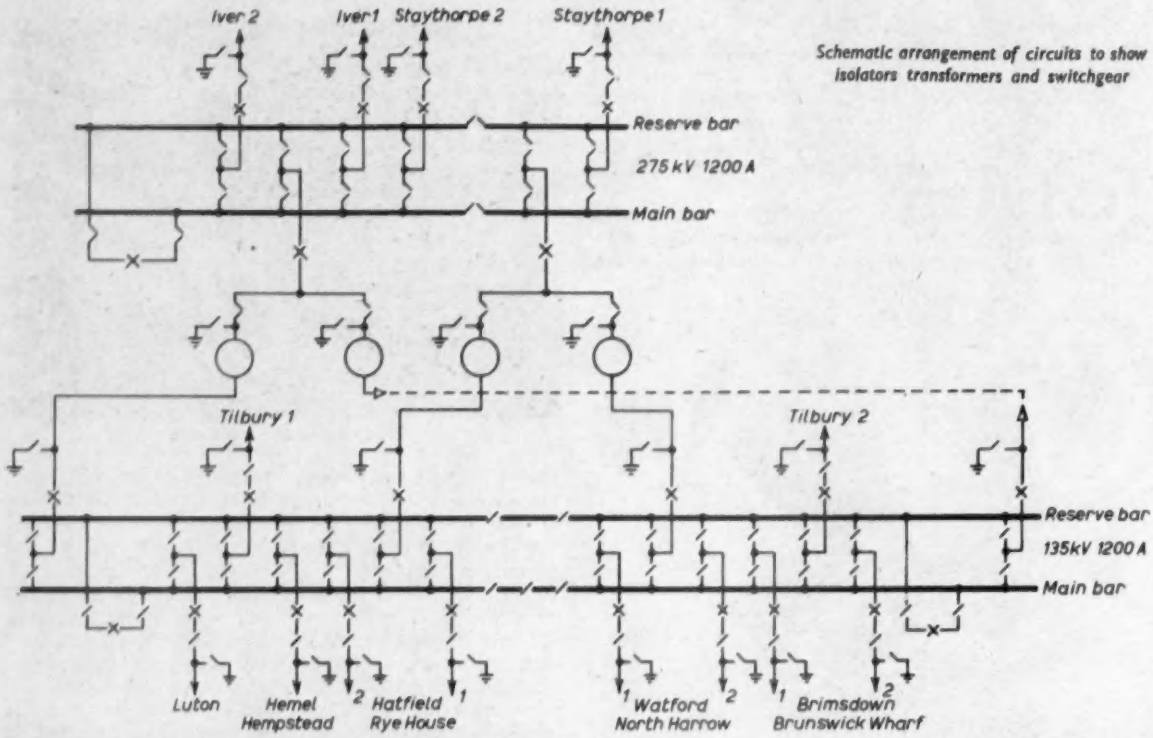
132 kV Switchgear

Circuit-breakers for the 132 kV substation are also of the air-blast type of 3,500 MVA rupturing capacity and each breaker again consists of three single-phase units with a separately mounted common local control cubicle.

The individual single-phase equipment has a circuit-breaking unit consisting of four single-break interrupters connected in series. The four interrupters are mounted vertically one above another, and they and the external



Elevation drawing of 275 kV breaker complete with isomaker



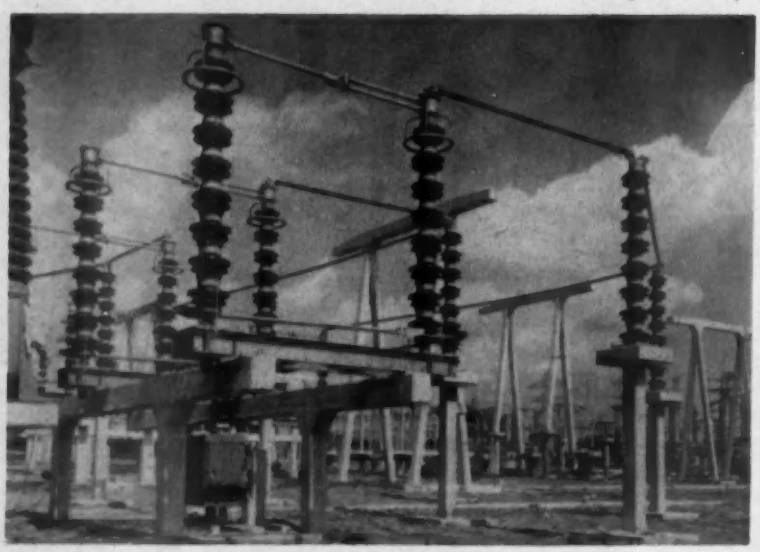
Schematic arrangement of circuits to show isolators transformers and switchgear

series contact arm are supported by an insulated pedestal structure on a welded steel bed-plate. In this case the series arm is pivoted at one extremity and moves through a vertical arc to establish contact either at a post insulator or current transformer terminal, as the case may be. The design of the interrupters and operation of the circuit breaker is generally similar to the 275 kV.

The 275 kV and 132 kV control panels are grouped separately and provided with hand-dressed mimic diagrams. When any semaphore is at variance with the actual position of any isolator or breaker, a flashing white light appears inside the semaphore. This is cancelled by correcting to the true position. Feeder control panels display current, megawatts and megavars. The indications on transformer panels are current, voltage and tap position or number. Synchronising equipment is provided.

Protection

Protection for the two Staythorpe 275 kV feeders consists of high speed phase comparison carrier current equipment. Continuous indication is given of the condition of the carrier channel, a check signal being initiated automatically at half-hourly intervals. Failure of this check initiates an alarm. The scheme is completed by capacitance coupling units and current transformers of the hairpin type. The latter are designed to operate oil-filled and under nitrogen seal. The two Iver 275 kV feeders are protected by a high speed balanced protective scheme operating over Post Office pilots. Single-phase capacitance couplers are provided on each circuit for synchronising and panel instrument supplies. The protection of each pair of 275/132 kV auto-transformers consists of a balanced scheme for each phase with current transformers at the neutral points and at the 132 kV breakers, balanced against a set of current transformers at the 275 kV breaker. On the 132 kV side of one transformer of each pair, there is provided one only single-phase wound type voltage transformer for synchronising and instrumentation, while on the other transformer three single-phase voltage transformers are provided for voltage reference, having also separate windings for connection as a three-phase bank of sufficient capacity to meet the essential auxiliary supplies. The 275 kV sides of each transformer bank are provided with a single-phase capacitance coupler for synchronising purposes.



The 275 kV isolators shown closed

The 275 kV bus coupler is arranged for emergency use in connection with any feeder or transformer circuit. A fully discriminative busbar protective equipment is provided for both the 275 kV and 132 kV substations.

The two 132 kV Rye House-teed-Hatfield feeders and the two circuits to Watford-teed-Hemel Hempstead, are to be equipped with high speed distance protective schemes. Wound type voltage transformers are provided on each phase. On the Rye House-teed-Hatfield feeders the voltage transformers carry separate windings of sufficient capacity to supply minimum essential auxiliaries. The two Tilbury feeders (275 kV operating at 132 kV) are provided with high speed phase comparison protective equipment, similar to that described for the 275 kV Staythorpe circuits. The remaining four 132 kV feeders are provided with balanced protection operating over pilot wires. These circuits are also equipped with single-phase wound type voltage transformers for synchronising and for providing the appropriate voltages to the instruments.

The operator's logging desk incorporates the alarm display units which give warning of failure of auxiliary power, potential and battery supplies, failure of the carrier equipment, faulty Post Office pilots, failure of air compressors, low air pressure in the main receivers, and low air pressure in the ring mains supplying the switchgear. Each circuit control panel accommodates its directly associated alarm indications.

As the substation is a key point in the transmission system, ample private and Post Office channels communicating with the Thames North Area Control Centre are provided, to which also feeder flow indications, feeder overload alarms and circuit-breaker positions are transmitted automatically.

The principal contractors engaged in the building of this site are Messrs J. L. Eve Construction Co., who are responsible for the civil works and line entries; Messrs A. Reyrolle and Co. for the 275 and 132 kV switchgear, protection and control; Messrs Crompton Parkinson for the interbus transformers, and the General Electric Co. for the 275 kV isolators. Acknowledgments are made to the Divisional Controller of the Eastern Division for permission to publish this article

Report from New Zealand

OVER 3,066 million units were generated by all plants in North Island, New Zealand, during the year ended 31st March last, an increase of 11·2%. In the South Island, power generation during the same period amounted to over 1,193 millions, an increase of 3·2%, while in the Nelson-Marlborough district some 121·8 million units were generated, a rise of 6·7%. These statistics are given in the annual report of Mr A. E. Davenport, B.E., M.I.E.E., general manager of the N.Z. State Hydro-Electric Department, just to hand.

North Island was again fortunate in avoiding power restrictions. The peak load carried was 645·5 MW, an increase of 13·9%, and the greatest weekly generation amounted to 66,795,000 units (12·1% up). The final machine was installed at Maraetai during the year, raising the available capacity in the Island to 651,550 kW. Both Evans Bay and King's Wharf steam stations were operated at maximum capacity available throughout the year, generating between them 223·4 million units.

In the South Island, load shedding was resorted to on several occasions, although the commissioning of the two new machines in Dunedin's Waitaki hydro-electric project brought welcome relief until a dry period necessitated further restriction. The maximum half-hourly load was 251·6 MW, an increase of 11·4%. Installed capacity rose to 214,810 kW. Altogether the year was one of widely fluctuating hydraulic conditions, which affected considerably the running of the hydro-electric stations, while the thermal auxiliary stations were brought into operation in June.

The Nelson-Marlborough system was aided by the commissioning of two 10 MW machines at the new Cobb hydro-electric project. This station generated over 96 million units—78·9% of the total for the district—but auxiliary stations were run every day from 1st April to late in September 1954 to assist over the peak periods and were run continuously for a further 131 days to assist with the water storage position at Cobb. During the winter extensive load shedding was necessary in the district.

The State Hydro-Electric Department operates 599 miles of 220 kV transmission line and 2,084 miles of 110 kV line. Lightning was again the greatest single cause of line faults, causing 70 outages. There was one instance of insulator flashovers due to salt deposits on the Bunnythorpe-Haywards 220 kV line. At the Bunnythorpe substation, scale formation in the condenser cooling system is still a problem, Mr Davenport reports, and during warm, humid weather it was found necessary to reduce the loading on the condensers due to reduced cooling. Much the same trouble has been experienced at Otahuhu, where a treatment plant for the condenser cooling water system has been installed. Scrub fires were troublesome in some districts, due to the hot, dry, weather. But in the Canterbury and West Coast areas pile driving and groyne construction were necessary to protect line supports from floods and river erosion. In routine maintenance, of the 444,972 pole line insulators tested 1,240 were found defective.

On construction work for new power stations much progress is reported. At Whakamaru, the spiral cases for Nos. 1 and 2 machines were assembled, and work proceeded on the casings of Nos. 3 and 4 machines. The good progress also continues on the Roxburgh and Atiamuri projects. Reference is also made to the Government's decision to take steps to provide additional power for the North Island by constructing a 180 MW coal-fired station on the Waikato, and to the geothermal steam station at Wairakei, as we have already reported.

Concerning the registration of electricians under the 1952 Act, it is noted that reciprocity has been established between the Board and the State Electricity Commission of Victoria for the interchange of registration certificates of Victorian and N.Z. electricians. But Mr Davenport bemoans the lack of sufficient tradesmen for various types of work in the Department. In particular, the number of suitable engineering graduates available during the last two years has been considerably less than in previous years, and this, together with a large number of resignations, has resulted in a reduction in the total number of professional engineering staff. "Over-employment" throughout the Dominion is largely blamed for this situation. Finally, the Department's operations for the year resulted in a surplus of £1,262,677.

Comparative Merits of 50c/s 25kV Traction

PAPERS AT LILLE CONVENTION ANALYSE ALTERNATIVE SYSTEMS

EARLIER in the year, in May, a Convention was held at Lille on "Electric Traction by Single-Phase Current at Industrial Frequency." This was the third meeting held on this subject, the previous ones being the Annecy Conference in October 1951, and the London Congress in May 1954. At neither of these gatherings, however, was it possible to quote actual operating experience with 50-cycle traction systems. Since July 1954, however, the Valenciennes-Charleville line has been in operation, and thus for the first time data is available on which a comparison between the various traction systems can be based.

This comparison was made in a paper by M. Garreau, Chief Engineer of French National Railways and Head of the Electric Traction Study Division. For the purposes of the study the North East France railway system was taken as being fairly representative of a large railway network. In the financial assessments, such items as track and station alterations, signalling improvements and other indirect works connected with electrification were not taken into account, as they would be needed irrespective of the type of electrification adopted. It was assumed that three basic types of locomotive would be needed. (*a*) Bo-Bo locomotives for high speed passenger trains (90 m.p.h.), (*b*) Bo-Bo locomotives for mixed traffic (90 m.p.h.) and (*c*) Co-Co locomotives for heavy goods trains, maximum speed at least 40 m.p.h. To simplify estimating, it was further assumed that locomotives of the types mentioned above would be used for suburban traffic.

Systems Considered

The three systems considered were 3,000 V d.c.; 15 kV, 16⅔ c/s, a.c.; and 25 kV, 50 c/s, a.c. As there was no 3 kV d.c. or 15 kV, 16⅔ c/s, systems operating in France, data was derived in the first case from Italian experience and in the second from Germany and Sweden. Further, the 16⅔ c/s system was again subdivided into two categories; distributed conversion where substations converted from the 50 c/s 3-phase network of E de F, and centralised conversion where the frequency change was made at large central stations and distributed as single-phase 110 kV to simple transformer substations.

The paper went into a detailed analysis of the requirements of all three systems, including number and type of substations, power requirements, overloads and other factors, and the first main conclusion arrived at was that for distribution, including substations and line sectioning equipment the 25 kV 50 c/s system cost about 33% of the other methods considered. The total first cost of the catenary, including track works to provide clearance was a little higher for 25 kV, 50 c/s, than for 16⅔ c/s, but was less than 3 kV d.c.

Investigations were also made into relative locomotive initial costs, signalling and communication equipment, employees required, maintenance, operating costs, and energy costs. The final conclusion in relative values, was that taking 25 kV 50 c/s as 100, the 16⅔ c/s system with distributed conversion would be 114, with centralised conversion would be 107, and 3 kV d.c. would be 107.

Behind the concept of 50 c/s single-phase traction supplied directly from a large network such as that of Electricité de France, lie the questions of unbalanced loading, and of demand. Two papers, one by M. Gastine (S.N.C.F.) and one by M. Cabanes (E de F) dealt with these problems.

The first of these defined the optimum requirements of the load from the point of view of the network. These were (*a*) the three phases should be balanced; (*b*) the load should be constant, or the variations in time slow; (*c*) faults should be few and current surges rare; (*d*) power factor should be close to unity and (*e*) harmonics giving rise to voltage distortion on the network should be avoided.

The reactions on the public system of a 50 c/s single-phase traction project were marked. Essentially an unbalance would arise, and althought the use of Scott transformers feeding two zones of contact lines could attenuate this unbalance it could not be eliminated. The critical points were that the ratio between the inverse component of the voltage and the direct component of the voltage should not be greater than 5% to ensure satisfactory operation of induction motors, and secondly, an unbalanced load produced in the alternator airgap a field rotating backwords at synchronous speed which induced heavy eddy currents in the rotor body at 100 c/s. When the alternators were of the low speed mutiple pole type as in hydraulic power stations, these eddy currents could be absorbed by the conventional rotor damping windings. With turbo-alternators, however, which were not fitted with damping arrangements, the eddy currents were localised in the slot wedges and might give rise to considerable heating with consequent distortion and other troubles.

Tests had been carried out which showed that a turbo-alternator must not supply in a continuous manner a single-phase load exceeding 10% of its rated capacity. A full investigation of the French system however, showed that no difficulty had arisen in the Valenciennes-Thionville system, and although in other areas less favourably placed for power supply, present rail electrification at 50 c/s might provide serious supply difficulties, these would disappear in the future as the electricity supply network extended. M. Cabanes, agreed with M. Gastine but pointed out that in particular cases, the night traction load, unsupported by the heavy industrial day demand on the network might be critical.

Remaining Papers

The remainder of the papers dealt with more specific points of detail in connection with 50 c/s railway electrification. The electrical factors involved in feeding the catenary from the French Grid system were considered by M. Raoult. He suggested that the voltages most suitable for use at substations were the intermediate voltages generally 63 kV or 45 kV. The 150 kV and 220 kV network required much more expensive transformers and would in many cases imply the use of reactors in order to keep fault levels down to a reasonable value. The paper gave details of the substation arrangements already in use on the Valenciennes-Thionville line.

Catenaries were dealt with at length in two papers by Mm. J. G. Walter and A. Crepet, while telecommunications and signalling were investigated at some length by Mm. J. Collet, Walter and Trogneux. Substation location and equipment was discussed in general terms by M. Bernard, and other papers were presented dealing with the various types of locomotive and their performances, which have been developed for use with 25 kV 50 c/s power. Here the brightest prospects appeared to lie with the recifier-carrying locomotives using ignitrons or "excitrons."

Seventh Year Survey

— A FURTHER EXAMINATION OF THE ANNUAL REPORTS OF THE BEA AND AREA BOARDS

PRINCIPAL features of the seventh report of the British (now Central) Electricity Authority and the fourteen area boards stood out clearly in the summary given in these columns last week. Sharply-increased sales, based on cooler weather and buoyant industrial production, gave a record turnover and a record disposable surplus. These generalities, however, show some variation in detail under an examination closer than was possible last week.

Sales

For all classes of consumer, the increase in electricity consumption over the previous year averaged 11·8%, and most individual consumer categories were near to this mark. Two exceptions stand out, however. Farm consumption doubled the average increase, with 22·4% excess on 1953-54; and sales for street traction showed the one exception to the tale of increases. The 11·1% decrease in this latter category continued at an increased pace, a trend that has been apparent for some years. Since vesting day nearly one-third of the road electric traction load has been lost.

An especially welcome feature of the year's operations is the increase in load factor achieved. Since 1950-51 load factor has been falling, which has meant, of course, that the fixed costs of electricity supply have had to be spread over a proportionally smaller number of units. To some extent, the continued fall has followed from the greater proportion of the potential demand for which generating capacity has been available at the time of winter peak. It is difficult to judge from published figures the overall financial effect of a change in load factor: and it must be remembered in considering future financial implications of this break in the trend, that the winter peak in the last financial year still exceeded the available generating capacity at full voltage and frequency.

Revenue

Translated into cash value, the increase in sales during 1954/55 produced a rise in turnover of £39·1m, compared with an increase in expenses of £33·5m. The increase in surplus earned, £5·6m is thus 14·3% of the extra turnover, while the combined surplus (£18·8m) is only 5·14%. To put the surplus further into perspective, it is desirable to note that it is calculated after allowing for expenditure of 9·74% of revenue (£35·6m) on interest payments, i.e. the "profit" was 14·9%.

Looking at the combined revenue account of the Central Authority and area boards, little change in the proportions of the various revenue categories is noticeable, except for

TABLE I.—AREA BOARD RESULTS: A COMPARISON WITH LAST YEAR

Area Board	Civil population per sq. mile	Domestic units/ domestic consumer	Industrial units/ind. consumer x 1,000	Consumer service d/unit sold	Distribution d/unit sold	Administration d/unit sold	Revenue d/unit			Bulk supply payments		Contracting, etc., account	
							Domestic	Industrial	Total	Total d/unit	Fixed charge d/unit	Surplus % of turnover	Indirect costs, % of turnover
London ...	1,975	**1,460**	**50·0**	**0·103**	**0·158**	**0·046**	**1·600**	**1·684**	**1·781**	**0·996**	**0·322**	**4·8**	**14·5**
		1,384	45·6	0·104	0·169	0·049	1·657	1·703	1·814	0·989	0·312	1·6	15·5
S. Eastern ...	1,062	**1,726**	**102·6**	**0·073**	**0·102**	**0·048**	**1·575**	**1·326**	**1·576**	**0·952**	**0·296**	**8·5**	**14·5**
		1,609	96·1	0·078	0·110	0·054	1·571	1·317	1·573	0·968	0·295	3·4	17·9
Southern ...	591	**1,528**	**125·0**	**0·053**	**0·114**	**0·050**	**1·626**	**1·425**	**1·590**	**0·949**	**0·293**	**4·9**	**16·1**
		1,442	115·0	0·054	0·115	0·053	1·667	1·391	1·593	0·945	0·278	1·6	18·9
S. Western ...	386	**1,416**	**121·0**	**0·075**	**0·119**	**0·050**	**1·745**	**1·384**	**1·642**	**0·937**	**0·290**	**2·0**	**19·3**
		1,340	89·4	0·079	0·128	0·058	1·706	1·390	1·677	0·927	0·284	—3·0	23·1
Eastern ...	633	**1,670**	**109·9**	**0·050**	**0·102**	**0·041**	**1·559**	**1·371**	**1·519**	**0·962**	**0·289**	**4·1**	**15·8**
		1,566	102·0	0·054	0·104	0·048	1·550	1·371	1·521	0·957	0·275	2·6	16·0
E. Midlands ...	593	**1,364**	**224·9**	**0·046**	**0·095**	**0·032**	**1·492**	**1·091**	**1·299**	**0·779**	**0·285**	**5·7**	**13·7**
		1,306	205·5	0·046	0·095	0·036	1·465	1·083	1·283	0·761	0·267	2·4	16·1
Midlands ...	819	**1,526**	**986·7**	**0·030**	**0·084**	**0·035**	**1·442**	**1·136**	**1·305**	**0·826**	**0·286**	**4·7**	**15·5**
		1,444	907·0	0·031	0·080	0·037	1·391	1·113	1·269	0·820	0·273	0·6	19·7
S. Wales ...	436	**1,056**	**604·8**	**0·036**	**0·092**	**0·032**	**1·605**	**0·918**	**1·066**	**0·708**	**0·217**	**4·0**	**16·7**
		968	559·5	0·038	0·093	0·034	1·665	0·901	1·064	0·674	0·198	—5·5	22·1
M. and N. Wales	605	**1,373**	**238·2**	**0·054**	**0·088**	**0·032**	**1·518**	**1·119**	**1·306**	**0·839**	**0·255**	**4·9**	**12·8**
		1,286	204·3	0·055	0·096	0·034	1·563	1·124	1·336	0·818	0·240	3·4	14·8
Yorkshire ...	1,022	**1,182**	**239·7**	**0·035**	**0·075**	**0·025**	**1·323**	**0·970**	**1·127**	**0·751**	**0·273**	**7·1**	**11·3**
		1,119	217·0	0·034	0·080	0·026	1·361	0·970	1·137	0·735	0·253	3·0	14·2
N. Eastern ...	528	**1,017**	**298·8**	**0·036**	**0·096**	**0·030**	**1·579**	**1·068**	**1·279**	**0·803**	**0·250**	**11·6**	**7·3**
		962	280·0	0·037	0·095	0·032	1·616	1·056	1·272	0·781	0·230	7·0	12·0
N. Western ...	945	**1,322**	**225·3**	**0·046**	**0·092**	**0·028**	**1·390**	**1·138**	**1·303**	**0·836**	**0·283**	**5·9**	**13·1**
		1,229	209·3	0·046	0·097	0·029	1·431	1·117	1·296	0·812	0·263	2·5	15·2
S.E. Scotland ...	404	**1,192**	**195·6**	**0·029**	**0·104**	**0·031**	**1·401**	**1·190**	**1·373**	**0·857**	**0·298**	**8·5**	**12·5**
		1,082	174·4	0·029	0·102	0·034	1·441	1·148	1·368	0·801	0·258	3·8	15·8
S.W. Scotland	516	**1,278**	**223·5**	**0·027**	**0·094**	**0·028**	**1·411**	**1·230**	**1·344**	**0·899**	**0·288**	**8·0**	**9·1**
		1,206	203·7	0·021	0·101	0·028	1·415	1·209	1·331	0·863	0·260	3·2	12·9
All Area Boards	—	**1,480**	**195·1**	**0·049**	**0·100**	**0·036**	**1·518**	**1·156**	**1·380**	**0·861**	**0·281**	**5·6**	**14·3**
		1,318	177·4	0·051	0·104	0·038	1·532	1·146	1·381	0·845	0·265	1·8	17·0

Bold figures refer to 1954–55, others to 1953–54.

TABLE II.—FINANCING OF YEARLY INCREASES IN FIXED ASSETS AND WORKING CAPITAL

Year	Total increase £million	Financed from internal resources £million	% from internal resources revenue
1950–51	129·5	30·7	23·7
1951–52	161·0	30·0	18·6
1952–53	157·8	40·0	25·5
1953–54	168·8	53·8	31·8
1954–55	203·2	64·4	31·6

"surplus on contracting and sales of fittings." This shows an increase from 0·18% (£0·6m) to 0·71% (£2·6m) largely, as stated last week, because the volume of hire purchase and similar sales was almost doubled. While all boards participated in this boom, its effect varied widely. Outstanding were the South Wales and South West Scotland boards, which more than trebled their turnover in this category. Of course, not all the profit from such sales is at once available: hire purchase transactions are financed from the board's capital accounts, and during the year, the balance sheet total under the heading "hire purchase and deferred payment instalments not yet due" rose from £14·4m to £27·4m—a £13·0m increase that compares with a £13·2m increase in this type of trading. It is a measure of the degree to which this business has increased, that at 31st March, 1950, the earliest date for which figures are available, the total in this category was only £5·3m. Of course, a further effect of these sales is hidden in the "sales of electricity" figures.

Expenses

Changing to the other side of the consolidated revenue account, none of the major items changed significantly in proportion, a slight increase in proportionate expenditure on generation and purchase of electricity, which follows from the increased sales, producing small drops in the proportion accounted for by most other categories. Amongst the minor items (financially), however, an apparent doubling of expenditure on "research and development" is noticeable. The scope of this item has been extended compared with previous reports, and so direct comparison is difficult, but it is stated that the greater part of the £0·22m increase in this category is due to an extension in research activity.

Much has been heard about the need for the supply industry to be self-financing to a greater degree, and it is of interest to examine the seventh report from this aspect. Some 31·6% of the total capital expenditure of £203·2m on fixed assets and increased working capital came from internal resources. Detailed figures for the last five years are shown in Table II. It is stated in the report that "in present economic circumstances it is quite clear that if the industry's financial stability is to be assured, it will be necessary to earn larger annual surpluses, in order to provide for a greater degree of self-financing of future capital programmes."

A feature of the accounts in the present report is the setting up of a new "supplementary reserve for depreciation of fixed assets." This is in itself mainly a bookkeeping change; some while ago the Authority stated that it intended to use reserves generally to assist in financing the replacement of assets, as well as to guard against occasional deficits. To some extent, the setting up of the new reserve fund is only a means of making this practice explicit. On the other hand, now that the intention to run the fund at the £10m level has been stated, it is clear that bulk tariff charges will be fixed with the attainment of a *minimum* surplus of this level in mind.

Engineering

Many of the engineering developments described in the report have, of course, been discussed in our columns when first announced There remain some which are best looked at in the setting of a complete year. A notable feature here is the markedly better record achieved in average availability of plant during the period when the winter peak is likely—Mondays to Fridays during December and January. At 11·3%, this loss of capacity was 1·1% less than in the previous year, and 2·3% better than in 1952-53. The main advance this year has been in avoidiing breakdown—at 6·2% this was 1·3% better than in the former year. Overhauls are a contributory factor to loss of capacity, but these are, of course, kept to a minimum during the winter.

With plant that is technically more complicated coming into use, it might be expected that the number of technical as distinct from manual staff would increase, in terms of "employees per megawatt." In fact, a fall has been taking place since 1951-52, and the proportion of supervisory and technical staff for 1954-55 was 0·27 employees/MW, against 0·29 in the previous year. The number of workmen is down more noticeably—1·80 against 1·91.

AREA BOARD PROGRESS

BY and large, their seventh year proved to be one of continued expansion and success for Area Boards, whose record, depicted in their individual reports, completes the picture of the Supply Industry. In virtually all spheres of activity, Area Boards advanced, and although their reports may not be as spectacular as last year, when the easement of restriction on capital expenditure, particularly for rural electrification led to a tremendous burst of activity, the picture given is one of solid achievement, highlighted by record progress in one or two fields. As already pointed out, all but one of the Boards showed a profit on the year's trading, without having generally to increase tariffs and in the face of increased bulk supply payments. To this end, however, there is little doubt that last year's weather proved more of an ally than an enemy, tending to increase energy sales without enlarging too much the maximum demand. Load factors, therefore, were generally higher.

In general, engineering work during the year conformed to now familiar pattern of the commissioning of new bulk supply points or extending others, and reinforcing the distribution system, and similar development. To detail the progress made by each Area Board is impossible, although each show continued expansion. Together with this commissioning is recorded the planning of further bulk supply points, apart from the schemes drawn up for the transmission scheme.

Less mention is made of the more specialised engineering work. Under this category, however, comes the work of the South Eastern Board, who have experienced trouble with birds, mostly swans, on Romney Marsh either flying into conductors or nesting on the pole equipment. Exten-

TABLE I. AREA BOARD COMMERCIAL AND ENGINEERING STATISTICS

Area Board	Consumers at 31.3.55 x 1,000	Increase during year x 1,000	Net maximum demand MW	Maximum demand 1953–54 MW	Load factor %	Increase in circuit miles of h.v. lines and cables	Increase in circuit miles of l.v. lines and cables	Consumers changed to standard a.c. supply*
London	1,698	26	1,776	1,745	40·4	120	163	55,845
South Eastern	1,090	38	973	972	44·2	264	223	13,613
Southern...	1,170	53	1,159	1,080	44·5	480	413	9,051
South Western	673	27	595	544	44·9	273	211	522
Eastern	1,541	61	1,563	1,487	45·0	594	476	7,046
East Midlands	1,161	50	1,321	1,239	46·1	480	489	10,997
Midlands...	1,261	50	1,769	1,681	45·6	525	434	10,102
South Wales	556	26	791	709	59·1	459	168	15,801
Merseyside and N. Wales	813	29	915	834	51·3	486	190	2,797
Yorkshire	1,368	54	1,647	1,532	47·6	718	337	6,649
North Eastern	873	52	886	833	52·6	354	252	5,014
North Western... ...	1,502	37	1,883	1,781	46·0	322	288	4,205
South East Scotland ...	410	19	393	337	43·8	202†	133†	126,209
South West Scotland ...	796	25	892	811	45·2	468	289	1,808

*The definition of a standard a.c. system varies but is usually between 230 and 250 V, 50 c/s. †Route miles.

sive work to modify the lines has been undertaken, the spacing between conductors and the number of bird scarers in use has been increased at critical points. The same Authority is also fitting auto-reclose circuit-breakers to minimise fault duration. Although the report does not state the type of auto-reclose unit; its statement that the circuit-breaker recloses after a "short" period would seem to indicate it is not a high speed (3 to 5 cycles) reclosure unit. The use of high-speed automatic circuit reclosers by the M.E.B., already reported in the ELECTRICAL TIMES, is to be extended and this Board also makes mention of the technique and special tools developed to enable h.v. line tappings to be made whilst the line remains energised. The North Eastern Board is also to install a limited number of high-speed reclosers to minimise interruptions of supply due to transient lightning effects. The installation appears to be in the nature of a pilot scheme, since they propose to install further units where appropriate if the equipment installed proves satisfactory.

Voltage Maintenance

Another experiment being undertaken by the North Eastern Board is the installation of a bank of series capacitors in order to maintain satisfactory voltage conditions on their system, particularly on longer lines. A considerable number of special tests have also been carried out by the N.E.E.B.'s meter-testing station at Newcastle, notable items being oscillographic records on colliery winders and temperature tests on o.h. line and u.g. cables. Special investigations by the North Western Board's central testing station included noise level tests on various transformer installations.

The high price of copper is mentioned in several reports as the incentive to consider substitutes. In most cases, the use of aluminium is being extended, but the Eastern Board have found it economical in sparsely populated rural areas to use steel conductors on short h.v. spur lines where only small loads are provided for. The same Board have also decided that the majority of their future transformer purchases will be of the "low loss" type using cold rolled orientated grain steel. As a means of reducing the cost of giving supplies to isolated premises, the Southern Board is investigating the practicability of utilising an h.v., single-phase, earth-return system of distribution. One or two boards also comment on the investigations being made into the use of cathodic protection systems, the Yorkshire Board mentioning their co-operation with the Central Authority in the preparation of a Code of Practice, which all Undertakers will be asked to adopt.

From the South Wales and North Western Boards' reports comes news of the use of aerial photography in surveying land over which new o.h. lines are to be run. In the latter authority's experience, the photographs taken are viewed in a suitable binocular apparatus, the resulting stereoscopic effect enabling the contour of the ground and the height of obstructions to be accurately ascertained. Claimed to be no more expensive that the usual method, aerial photography has the advantage of not disturbing farmers on the first survey, whilst any slight deviations which may be necessary can be plotted without further visits to the site. Note is also made in several reports of the increased use of mechanical hole borers in erecting new lines.

The record of system operation during the year saw again the preponderance of lightning in the causes of outages, although the gales of last autumn also caused considerable damage. Moreover, the severity of the winter gave rise to a number of line failures due to ice formation or the build-up of snow. Few cases of load reduction by disconnection of supply are reported, these mostly occurring in October last year when presumably demand increased whilst plant was out of service for maintenance. During the period of peak demand, no load shedding appears to have been necessary, although voltages had to be reduced in certain areas. Considerable mention is made of short wave radio in assisting system operation whilst a further development is the use of trailing cables, already reported in the ELECTRICAL TIMES, by the South Western Board to bridge gaps in o.h. lines caused by maintenance work.

Commercial Operations

Turning now to Area Boards' commercial operations, two highlights stand out of the steady progress being recorded. The first is that of load factor which, universally, is better than the previous year. Although activity in promoting off-peak sales may have been partly responsible, it is clear that the major factor was the year's generally lower temperatures, which produced a consistently higher average demand without affecting the peak demand to any great extent.

The other highlight in the picture is the sales of appliances which are by far and away greater than last year. Particularly is this true of water heaters and washing machines, sales of which have been, on average, doubled, and in certain cases, even quadrupled. This is the experience of the South Wales Board, whose sales of washing machines were just under 8,000, compared with a little over 2,000 the year before. Even more spectacular are washing machine sales, which, from the 1953-54 total of just under 1,000, rose to just over 5,000. Although most of the boost experienced by Boards was due to the

removal of control on hire purchase and credit sale agreements, which came into effect in July 1954, impetus was also given by the extension of maximum repayment periods to as much as 10 years in one or two cases. Consequently, the new control imposed in February of this year is seen by most Boards to have resulted in a decline in appliance sales which is likely to affect the 1955/56 picture.

Another field in which considerable progress is recorded is that of off-peak loads. Most Boards make mention of new space heating installations designed for off-peak operation. The South Western Board comments that many more firms have turned to this method of heating for shops and offices, installations in the Bath and Bristol Area now numbering 120 and totalling 2 MW. Thermal storage heaters of the concrete block type are giving satisfaction in the North Western Board's area, and a large new motor car showroom in Manchester is one example. A large office block in Wythenshawe is using a thermal storage heating not only for space heating but also for hot water supplies and kitchen steam.

Even greater interest in space heating is reported by the South East Scotland Board, where an additional 5·67 MW will be secured from activities during the year. Included in the contracts secured was one for the College of Agriculture, Edinburgh, of a 1,128 kW under-floor installation, together with 200-300 kW of water heating. A school and health centre is notable in that its floor heating installation is being designed to provide comfort against an outside temperature of 20° F.

Other items in the sphere of commercial activity and consumer service includes a comment by Manweb that, due to conversion from tramcars to omnibuses, sales for traction purposes fell by 5 million units. Activity by Seeboard, which departed from normal practice by giving, district by district, reports of development in sub-areas, included an experimental street lighting installation in a new housing estate of Petersham, in which five different types of lantern were used to assist the Richmond Council in selecting the most suitable type for lighting the whole of its side streets. Near Merstham, an unusual installation was completed to give supply to a caravan site. From an o.h. line system, services feed outlets adjacent to each of the 140 caravans to permit easy connection or disconnection.

Rural Development

In the sphere of rural electrification, the picture is again one of steady progress, although less emphasis is given to this subject than was given last year. In the South-Western Board, the change from their line rental method of charge to the new rural development contribution system has made possible a new approach to forward planning, providing a standard scale of reasonable connection charges irrespective of distance from the existing mains. By the end of the year, the pace at which rural development was going forward brought the total number of new farms connected to a higher figure than was achieved in the previous twelve months. The new policy has also made it possible to undertake schemes in more remote country.

Last year's wet summer greatly stimulated interest in grain dryers, and the Eastern Board report a number of installations, together with increased use of electricity for pig rearing and fruit storage. With the extension of their system into more remote areas, the use of electricity for driving pumps used on land drainage schemes has become possible, and a number of River and Drainage Boards have discussed the change over of their pumps from diesel to electric drive.

TABLE II.—PROGRESS IN RURAL ELECTRIFICATION

Area Board	Farms connected at 31 Mar., 1955	Increase in farming consumers	Units purchased by farms (x 1,000)	Farming units/ farm consumers
London	82	—	482	5,879
South Eastern ...	8,860	470	61,201	6,908
Southern	17,281	1,164	129,255	7,474
South Western ...	13,917	1,200	66,375	4,771
Eastern	18,330	1,294	123,890	6,760
East Midlands ...	19,604	1,504	126,673	6,460
Midlands ...	109,196	2,140	698,273	6,400
South Wales ...	6,768	1,311	21,827	3,227
Mersey & N. Wales	15,394	1,739	62,641	4,072
Yorkshire ...	13,186	1,320	54,689	4,149
North Eastern ...	8,634	1,472	41,075	4,759
North Western ...	18,287	1,070	90,883	4,971
S.E. Scotland ...	2,967	352	26,797	9,034
S.W. Scotland ...	7,764	604	61,612	7,940

Finance

Financially, all but one Board succeeded in showing a surplus on the year's trading, the exception being the South Wales Board. This was accomplished without increasing tariffs, and in the face of an increased bulk supply tariff and higher fuel and labour costs. Many Boards, however, undertook tariff reviews, the result of which has been seen more recently. What tariff changes have been made are by and large changes of detail only, although the Yorkshire Board has introduced a standard industrial tariff together with a special tariff for public lighting. Seeboard offer new off-peak rates of either 1d. or 0·9d. depending on whether the supply is taken only in winter or throughout the year. To benefit private homes for children or for the elderly, the Southern Board modified their commercial tariff by applying a domestic assessment in rooms in premises to which the tariff applies. On costs generally, most Boards have succeeded in minimising those costs over which they had control, whilst the reduction of the coal cost variation in the bulk supply tariff is welcomed.

In reviewing the work of Consultative Councils, whose reports are bound with those of their respective Boards, it is clear that much of their activity, as in the past, was concerned with consumer representations and operation of tariffs. However, quite a number give some details of evidence submitted to the Committee of Inquiry into the Electricity Supply Industry sitting under the chairmanship of Sir Edwin Herbert, although the Boards themselves were more reticent. Several councils suggested that the name of the Council should be changed to something on the lines of "Electricity Consumers' Council."

The South Eastern Council reaffirmed its earlier views regarding the need for the exercise of consumer influence over the industry as a whole, and also recommended greater flexibility in the constitution of consultative councils, so that each reflects more adequately the characteristics of its area, and that sufficient financial resources should be made available for councils' use for publicity. Also reaffirming earlier decisions was the Eastern Council, who again stressed the effect of the bulk supply tariff as a major cause of the continually increasing tariffs to consumers. Broadly, their view was that the Central Authority should examine the financial position of each Board in relation to the nature of its area to ascertain whether bulk supply charges could be made more equable. They were unable to see any justification for calculations of fuel costs on a divisional basis since divisions were areas set up for administrative convenience. Moreover, since Parliament, they felt, had recognised that all Area Boards would not have the same balances of profit available annually, one of the purposes of the Central Reserve Fund was the making of grants to Boards as a means of levelling out inequality.

notes on wiring

by Megohm

WITH the annual ritual of "putting back the clock" upon us and the return of darker evenings, many householders are considering their needs for heating their homes. Many people, myself included, enjoy the pleasant warmth of the coal fire, but there are just as many others who believe that electric fires are more pleasant and they are, of course, less trouble.

Electric Fires and Convectors

Electric fires can be divided into two types, of course, bar and reflector. The bar type combines radiation and convection and has certain advantages over the reflector type fire. Heat emission is approximately 60% radiant and 40% convection.

The element of a reflector type fire is constructed by winding a fireclay rod with nickel-chrome resistance wire and the rod is mounted at a focal point of a highly polished parabolic reflector. Radiant heat in a concentrated form is thus projected in any desired direction bringing immediate warmth to those in the path of the heat rays. With the reflector maintained in shining condition, radiant heat emission may be as high as 80%, the balance representing convection, though some authorities suggest a higher proportion of convected heat than this.

Electric fires are too varied in size, style and design, and probably too well known for me to describe. The sobering thought is, however, that every electric fire if handled or connected incorrectly, can be a lethal piece of apparatus. All electric fires sold should have guards fitted in accordance with the Heating Appliances (Fireguards) Regulations 1953, but there are still many fires around which were sold before this came into force. Credit must be given to the many manufacturers who realised the dangers, before the Regulations came into force, and guarded their fires accordingly, but many accidents have occurred with cheap makes of fires which had absolutely no guard in front of the element.

Convection heaters employ "black" heat elements of robust construction which are practically everlasting. In operation, cool air is drawn up through the base of the appliance, passes over the heating elements and emerges as warm air at the top. With this type of heater, the entire room is warmed very quickly and, having all electrical parts completely concealed, the design is extremely safe. I, personally, find working in a room heated by this means makes me very tired indeed, but, of course, the fault may be with my working parts.

Aluminium Sheathed Cables

Following my Notes on Wiring which discussed School Installations I was very gently brought to heel for not mentioning the use of aluminium-sheathed cables. My reason for not mentioning these cables was really quite simple. I had never used them myself and, therefore, felt that I had better not comment on them. However, I have taken the necessary steps to rectify this and recently spent some time watching work on an installation of this type.

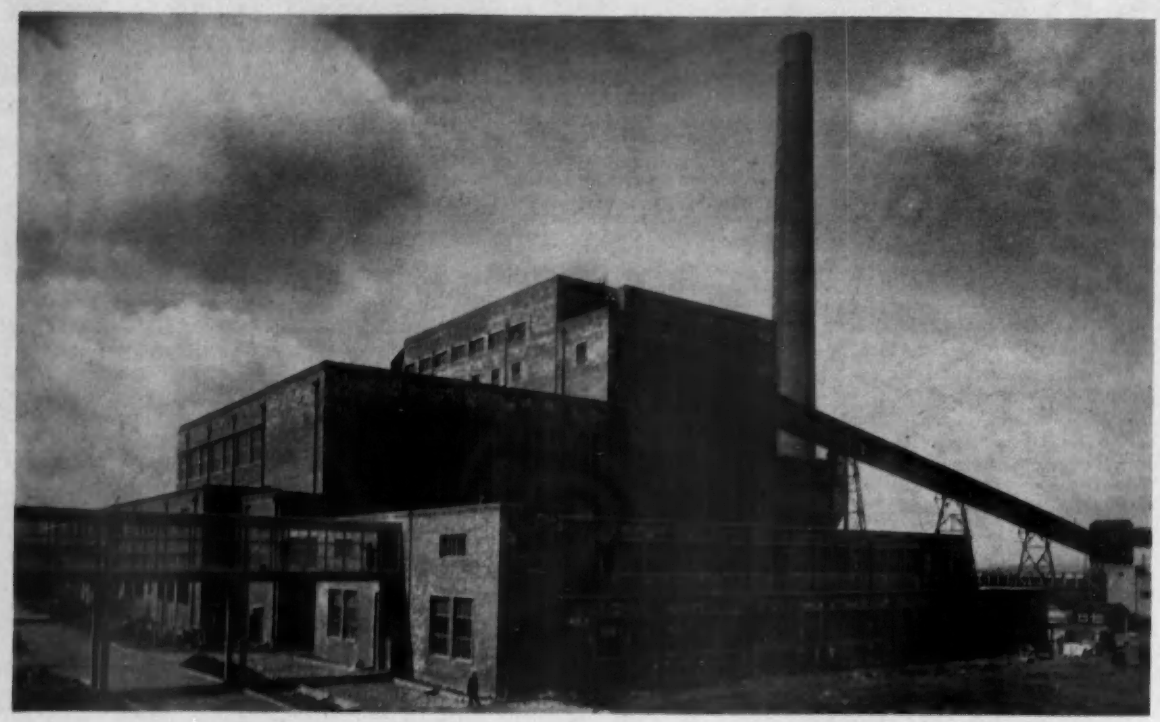
The first thing which struck me was the lightness of the drums of cables in comparison to lead-sheathed or rubber-sheathed cables of equivalent size and lengths. The protection afforded by the aluminium sheathing against mechanical damage is much greater than that given by lead sheathing. The appearance of the cable when installed on the surface is quite attractive and not unsightly. Installation is comparatively simple but, as in all cases of electric cable, care must be taken to guard against damage to the insulation by faulty handling. Bending tools are available for the different sizes of cables as are fixing saddles. These saddles are of the spacer bar type with single fixing hole. Adaptor glands are required where cables enter conduit boxes and accessories, and a special gland is available for flameproof situations. The ordinary gland incorporates a heavy neoprene washer for sealing, and a split metal ring to provide mechanical grip and electrical continuity.

These cables can be protected against corrosion in situations such as exposure to salt water, by means of a p.v.c. sheathing and where this serving is used, special precaution must be taken at gland positions. Bare aluminium-sheathed cables can be embedded in ordinary cements, concretes or plasters without risk of serious corrosion. To prevent the plaster cracking, where only a thin layer covers the cable, a thin coat of bitumen should be applied to the sheathing. Care should be taken to avoid direct contact with damp, whitewashed walls or absorbent materials such as wood or paper in permanently wet conditions. Wood acids are not in themselves dangerous to the aluminium sheathing.

The manufacturers recommend certain minimum bending radii for different sizes of their cables. These should be carefully noted when installation is carried out and their recommendations on spacing distances of saddles are also useful. This type of cable is remarkably rigid and a competent operative can turn out a very neat, reliable and lasting installation. Again space permits me to touch only very slightly on this subject.

Boxes for Patent Partition Walls

Some months ago I mentioned the development by a switch manufacturer of a special box for use in hollow partition walls. I have been asked on several occasions when these boxes are going to be on the market. The manufacturer, I understand, has experienced some hold up on the production lines, but this has been overcome and outstanding orders should be dealt with quite soon. I have not received up-to-date information on the latest developments in this field, but have spoken to many contractors who intend using these boxes. A useful addition to the range would be boxes for 5, 13 and 15 amp switch-sockets, and I sincerely hope the manufacturer has these in mind. Of course, the need for boxes of this type for bell pushes, flush bells and buzzers, etc., is quite considerable and a ready stock of such boxes would be an asset to any contractor.



Coal Direct

BOLD "A" power station, opened last Friday by Mr Eccles, Deputy Chairman (Operations), C.E.A., is in an area prolific in collieries. Around the station there are no less than six coal mines, and opportunity has been taken to connect one of these by conveyors directly to the power station. Provision has, of course, been made for alternative rail-borne sources of supply, but only a limited number of power station sidings have been laid down. In the event of the colliery supply failing completely, however, arrangements have been made with the National Coal Board for the use of the extensive system of sidings in the colliery area for reception and marshalling of trucks from other areas.

On leaving the colliery, the coal, which is supplied on a two-shift basis, passes through a batch weigher and automatic coal sampler provided by the N.C.B. for the purpose of costing coal delivered. Arrangements, however, have been made for check weighing on the C.E.A. behalf. The coal then is delivered on to the first of the power station conveyors and transferred to the main junction tower whence it can be stocked out to the coal storage area, which is capable of holding 13 weeks' supply. Alternatively the coal can be carried to the station bunkers via a magnetic separator, screens and crushers. With rail-borne coal, a side discharge tippler transfers the coal from trucks to a conveyor belt and again to the main tower.

The conveyor system from the colliery and the system from the tippler are both capable of handling coal up to 200 tons/hr. In the coal handling plant design, the requirements of the future "B" station have not been overlooked and space is left for the provision of the extra equipment required to feed this second station. At the moment, the colliery production of smalls is not quite sufficient to supply the full demand of the station, but Bold colliery is still under development and is expected to provide ample fuel shortly.

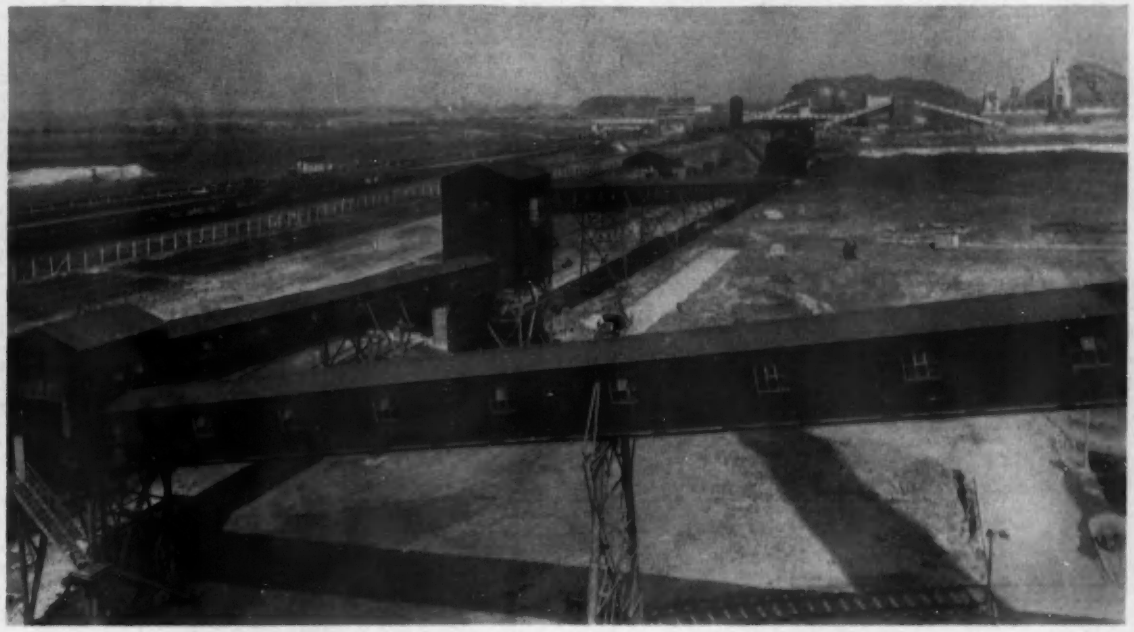
The photograph gives a general view of Bold "A"

The boiler plant, as would be expected in a station with unit sizes of 30 MW and a stop valve pressure of 625 lb/sq in., 865° F, is fairly straightforward. The main boilers, of which two are installed at the moment, have each an evaporation at m.c.r. of 300 klb/hr, and at m.e.r. of 240 klb/hr. Firing of the pulverised fuel is by 12 "Lopulco" burners, situated at the corners of the furnace in banks of three. The method of firing is tangential, and temperature control can be exercised by tilting the burners. The superheater is of the "Melesco" self-draining type, arranged to form high and low temperature sections in the gas path, with a single steam flow across the unit width.

Master control is provided by a steam pressure element, which maintains constant steam pressure at all loads. This element, via a pneumatic system, controls the regulators. These are of the hydraulic type and operate on the forced draught air flow, primary air and mill feeder and furnace pressure. The burners are tilted pneumatically by "Kent" control equipment, which is designed to hold the superheater outlet temperature constant between boiler evaporation rates of 240 klb/hr and 300 klb/hr. Normally the boilers and their associated turbo-alternators operate on the unit system, but a "hospital" cross connection has been provided on the steam side for emergency purposes and a common feed water system is provided.

Ash Handling

The ash handling plant is designed to deal with ash and dust accumulated during the steaming of four boilers at m.c.r. for a maximum period of 16 hours. The entire operation of removing this accumulation takes about seven



BOLD "A" POWER STATION HAS BELT CONVEYOR LINK

from Colliery to Bunkers

hours. The plant uses the high pressure recirculation system for the hopper removal and an air-borne suction system for removal of dust from the electrostatic precipitators and the chimney base. This dust after passing through cyclone collectors is discharged through vacuum unloading gear to a concrete dust bunker of 160 tons capacity. It is transported to the disposal area by lorry together with the main ash from the boiler hoppers.

Generating Plant

The turbo-alternators are 30 MW sets running at 3,000 r.p.m. Each machine is of the two-cylinder impulse type with the l.p. section exhausting into twin three-flow condensers. There are four bled steam heaters, two high and two low pressure, the final feed temperature being 345° F.

Motor-driven barring gear is installed, and during barring the oil supply to the bearings is maintained by an a.c. motor-driven auxiliary oil pump, which also comes into operation automatically should the main oil pump, which is driven from the turbine shaft, fail to maintain the bearing pressure above a predetermined value. A further d.c. driven pump supplies bearing oil in the event of failure of the a.c. oil pump.

The economic rating of the sets is 24 MW with steam conditions of 600 lb/sq in., 850° F, and a vacuum of 28·7 in. Hg. For m.c.r. running the design vacuum is lower at 28·4 in. Hg.

Cooling of the alternators, which generate at 11·8 kV, is carried out by means of integral fans on the rotor shaft. The air-cooler, which is of the finned tube type, is located in the closed circuit in the foundation block, the water from the coolers being taken from the circulating water system. The main and pilot exciters which are direct driven are arranged so that brushes may be changed while the machines are on load.

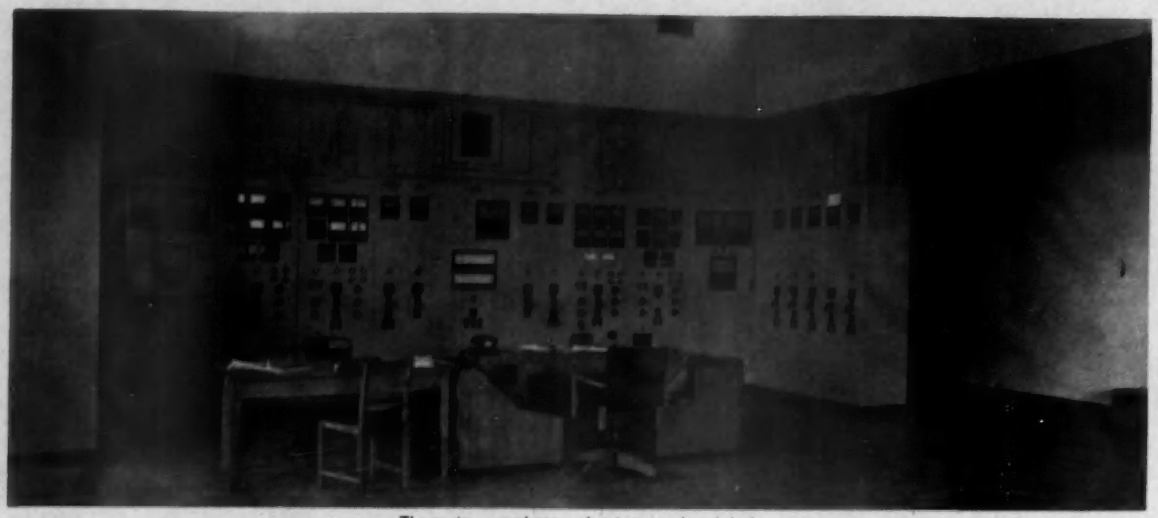
Auxiliary Plant

Feedwater is delivered to the boilers by means of feed pumps located at basement level in the turbine house. Three electrically-driven seven-stage centrifugal pumps, each capable of delivering 330 klb/hr of water at 850 lb/sq in., and two six-stage centrifugal turbine-driven pumps, each capable of delivering 165 klb/hr, are provided. A similar number of pumps will be provided for the second pair of sets.

At the moment two sets of evaporating plant have been installed and a further unit will be required for the completed station. The output of each of these evaporators, which are self-contained triple-effect live-steam units of the vapour compression type, can supply 20 klb/hr of distilled water for boiler make-up purposes.

High and low pressure heaters and drain coolers are arranged on either side of the foundation block at suitable levels. An automatic electro-mechanical device is fitted to ensure that in the event of a burst pipe in either of the h.p. heaters, the feed water is diverted to bypass the heater. Two main three-stage steam-operated air ejectors are arranged at a suitable height on the side of the foundation block, and for rapid raising of vacuum a quick start ejector is provided additionally. Two vertical spindle

The coal conveyor system links the colliery (in the background) with the power station



The main control room showing panel and desk

motor-driven extraction pumps are also provided in the basement alongside each condenser.

Water softening is by a fully automatic hydrogen-ion base exchange blended type plant with a capacity of 4,000 gallons per hour when softening town's water to zero hardness. The plant consists of two units of 2,000 gallons per hour output each. The raw water flow is divided between a hydrogen-ion unit and a sodium-ion unit, the two being arranged to operate in parallel. Automatic rate-of-flow controls maintain a constant ratio between the effluent flow rates so as to obtain the desired alkalinity in the mixed effluent. This process produces carbon dioxide in the water which has to be removed by means of a degassing plant. Any residual carbon dioxide is stabilised by dosing with caustic soda.

Below: A view of Nos. 1 and 2 boilers, with bottom, the main 33 kV switchgear

One cooling tower is provided to cool circulating water for two sets, and the tower is suitably divided so as to allow one half of the tower to be in commission when only one set is operating. The c.w. pumps are of the vertical spindle type. Two are at present installed, each capable of handling 23,000 gals/min and they discharge through rectangular concrete culverts to the condensers. The water for cooling will be derived initially from canal and later from the effluent of the St. Helens Sewage Works. Chlorination plant is installed for treating the circulating water. A further pumphouse is located adjacent to Parr Sewage Works, about 2 miles from the power station, and is connected by twin 15 in. asbestos cement pipes to the cooling tower ponds. The power supply to the pump motors is from the Bold "A" station busbars via 3·3/·415 kV transformers. Control of the pumphouse motors is exercised from the power station itself, and ultimately six pumps, each of 50 gals/min capacity will be operating to supply the make-up water to the cooling tower system.

Electrical Equipment

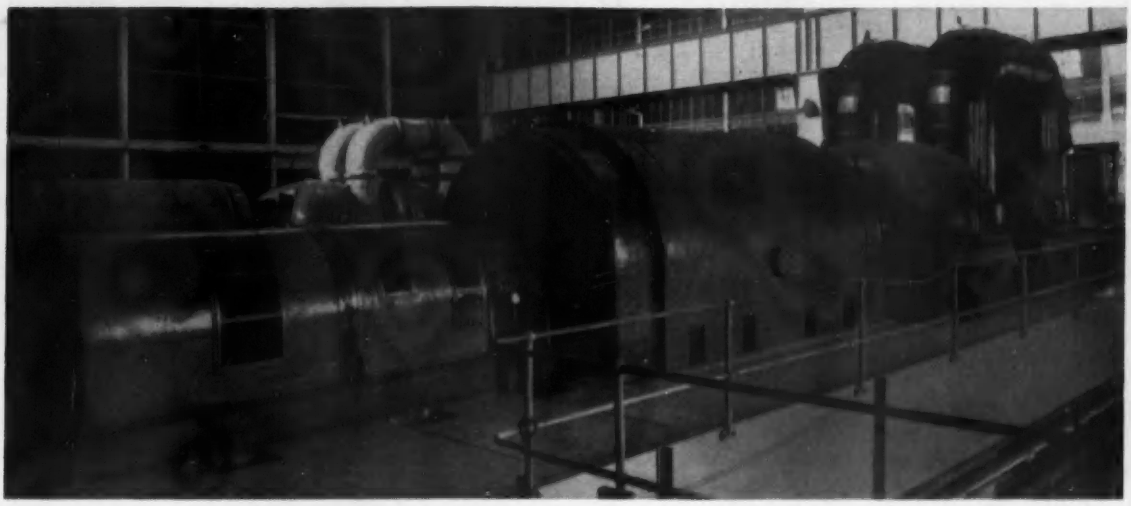
The generators are connected to the 33 kV system by 36 MVA 11·8/35·4 generator transformers, there being two 50% coolers per transformer. Each transformer is fitted with "on-load tap-changing gear.

Main 33 kV switchgear is of the bulk oil type and has a breaking capacity of 750 MVA. It accommodates the four 30 MW generator units, two station transformer units and eleven feeder units, together with bus-coupler and bus-section switches.

All station supplies and supplies to non-essential auxiliaries are obtained through 6 MVA 33/3·3 kV transformers of the natural cooled type. The boiler feed, c.w. and sluice pumps are driven by 3·3 kV motors; all the other auxiliary circuits operate at 415 V. Metering of the circuits is generally effected at 33 kV, the exceptions being the 3·3 kV side of the unit transformers and the 415 V boiler house boards.

Experimental Work

A certain amount of experimental work is to be carried out at Bold. In the first two generator transformers the performance of B.S.148 transformer oil will be compared with that of B.S.148 oil to which has been added phenyl-β-



A view of No. 1 turbo-alternator, with No. 2 set in the background

naphthylamine, and in the second two generator transformers a similar comparison will be made using 2:4 dimethyl-6-tertiary butyl phenol as an additive.

The cooling towers are fitted with C.E.A. louvre-type eliminators to reduce precipitation over the surrounding area, and in No. 2 tower tests are being carried out on the following packings; untreated Douglas fir, untreated green-heart, untreated Honduras pitchpine, untreated Scandinavian redwood, Scandinavian redwood treated with Tanalith with a dry salt retention of 0·5 lb/cu ft, Scandinavian redwood with Tanalith with a dry salt retention of 0·33 lb/cu ft, and glass slats.

Opening Ceremony

Mr A. R. Cooper, Controller of the N.W., Merseyside and N. Wales Division, began proceedings by welcoming the guests, and was followed by Mr Eccles who referred to the heavy increase in the use of electricity, no less than 76% since 1940. The hope of the future lay in the peaceful use of atomic energy, and it was expected that Calder Hall would go into operation in 1956, and by 1975 enough atomic electricity would be available to provide the equivalent of 40 million tons of coal per annum.

He particularly thanked the Local Authorities, the Architects, J. L. Couves and Partners; the Consulting Engineers, Messrs Merz and McLellan, and James Williamson and Partners, and Mr Cooper and Mr Briggs for their work in connection with completing the station in the shortest possible time. He then unveiled a plaque commemorating the occasion.

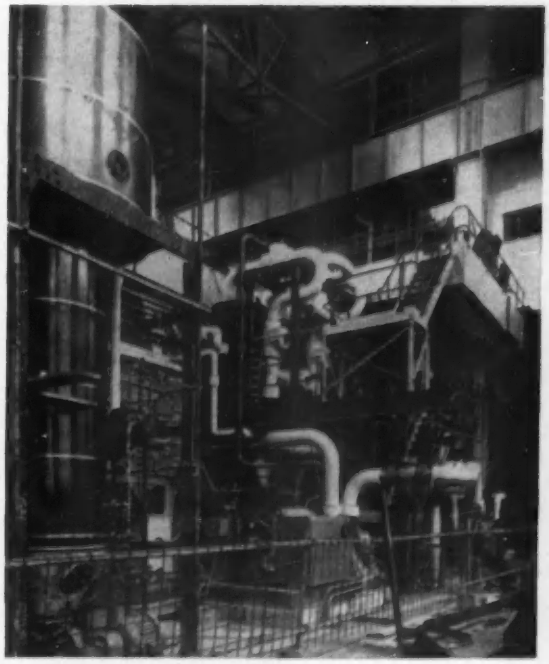
Mr A. Howell, of Merz and McLellan, replied on behalf of the contractors. He said that today 30 MW sets were small fry compared with the 200 MW and larger sets coming along. Bold "A" was, however, none the less important for all that. It had only taken 3½ years from the early site works to the commissioning date. When the station was completed in 1957, it was hoped that thermal efficiencies in the region of 29% would be attained.

A short service of dedication was held by the Right Reverend the Lord Bishop of Liverpool prior to the station being opened to the guests and visitors.

PRINCIPAL CONTRACTORS

Main Foundations and Superstructure	John Laing and Son Ltd.
Structural Steelwork	Dorman Long and Co.
Cooling Towers	Film Cooling Towers (1925) Ltd.
C.W. Make-up Supply Mains and Pumphouse	Sir A. McAlpine and Sons Ltd.
Boilers	Yarrow and Co., Ltd.
Economiser	E. Green and Sons
Precipitators	Lodge-Cottrell Ltd.
Combustion Chamber and Pulverisers	International Combustion Ltd.
Superheater	Superheater Co., Ltd.
Coal Handling Plant	Naylor Bros. Ltd.
Tippler and Weigher	Mitchell Engineering Co.
Motors	Lancashire Dynamo and Crypto Ltd.
Ash Handling Plant	B.V.C. Industrial Constructions Ltd.
Pumps	Gwynnes Pumps Ltd.
Motors	English Electric Co.
Colliery Conveyor	Spencer (Melksham) Ltd.
Colliery Conveyor Motors	Laurence Scott and Electromotors Ltd.
Turbo Alternators and Generator Transformers	Metropolitan-Vickers Electrical Co.
H.P. Pipework and Evaporating Plant	Alton and Co.
Pump Motors	Metropolitan-Vickers Electrical Co.
Feed Heating and Condensing Plant	Vickers Armstrong Ltd.
Condenser Tubes	Yorkshire Copper Works Ltd. and I.C.I. Ltd.
Extraction Pumps	Drysdale and Co., Ltd.
Motors	Metropolitan-Vickers Electrical Co.
Boiler Feed Pumps	Harland Engineering Co., Ltd.
Water Treatment Plant	Permutit Co., Ltd.
C.W. Pumps	W. H. Allen and Co.
C.W. Motors	British Thomson-Houston Co.
H.V. and L.V. Auxiliary Transformers	Brush Electrical Engineering Co.
Auxiliary Switchgear	English Electric Co.
Main Switchgear	A. Reyrolle and Co.
Main and Multicore Cables	B.I.C.C. Ltd.
Telephones	Standard Telephones and Cables Ltd.

No. 1 set condensing and feed water heating plant; No. 1 electric feed pump, and portion of No. 1 central evaporating plant viewed from turbine house basement



Shunting Locomotive Design

Electrical Features of New Power Units

CURRENTLY being tested and commissioned by British Railways are ten diesel-electric shunting locomotives with power units comprising Crompton Parkinson electric traction equipment and Crossley prime movers. Mechanically the locomotives are to British Railways' familiar standard 0-6-0, 350 h.p. design.

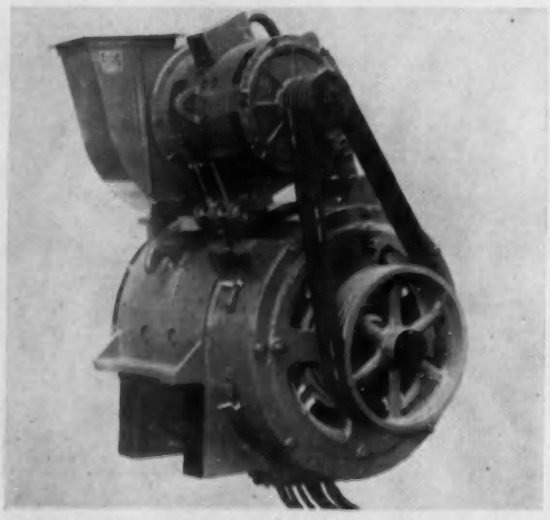
The power unit consists, basically, of a two-cycle scavenge pump diesel-engine, a single bearing generator of the self-ventilated pattern and two axle-hung, nose-suspended traction motors. A belt-driven auxiliary generator has been provided which is mounted on the main generator. The maximum tractive effort provided by the power unit is 35,000 lb, as specified in the contract. The continuous tractive effort is 15,400 lb at approximately 5½ m.p.h., whilst the maximum speed is 20 m.p.h.

Generator Design

The main generator has a 1-hr rating of 220 kW, 570 amp, 385 V, 825 r.p.m., and a continuous rating of 214 kW, 492 amp, 435 V, 825 r.p.m. In common with the rest of the power equipment, it has been designed on simple robust lines. It is a single-bearing, self-ventilating machine, solidly coupled to the Crossley EST diesel engine. The armature is built on a shaft which is a special forging, the shaft and coupling being in one piece.

The generator has three field windings, i.e., self and separately excited shunt windings, and a series winding which is used only for starting purposes. Its characteristics have been so designed that no complications such as separate exciters or regulating devices are necessary, whilst at the same time avoiding risks of overloading the engine beyond predetermined limits.

Mounted on the main generator is the auxiliary generator, which, in turn, has a centrifugal blower mounted on it for the forced ventilation of the traction motors. This arrangement obviates the need for more than one belt drive from the main generator. The 1-hr rating of the auxiliary generator is 90 V, 13·5 kW at 1,165/2,750 r.p.m. and the continuous rating is 90 V, 12 kW at 1,165/2,750 r.p.m., the corresponding engine speed being 350/825 r.p.m. The auxiliary generator voltage is maintained at 90 V by means of a carbon-pile automatic voltage regulator installed in the driver's cab.



Main and auxiliary generator for 214 kW continuous rating

Traction Motors

The two axle-hung nose suspended traction motors have double reduction gearing, one gear wheel and pinion being accommodated at each side of each motor. The layshaft joining the first and second train is carried on roller bearings, and is mounted in an eccentric shaft, whereby the drive is easily de-meshed if the locomotive has to be moved at speeds in excess of 20 m.p.h. from one shunting yard to another.

The motors are nose suspended, the necessary resilience being introduced by rubber springs located between the nose support and the fixing on the locomotive frame. Suspension bearings are of the conventional type, but to simplify maintenance, the lubrication is by means of Armstrong lubricators.

The control gear was designed and made by Allen West and Co., Ltd., to C.P.'s requirements. It is contained in a single desk type cubicle located in the driver's cab and has controls which are to the standard B.R. pattern. The power circuits are also standard to British Railways in that the two traction motors are connected in parallel across the main generator.

Crompton Parkinson Ltd. were responsible for the supply of the exhauster which is driven by a C.P. self-ventilated, 2·3 h.p. motor, and a Westinghouse motor-driven compressor. As main contractors for the power equipment, Crompton Parkinson Ltd. were also responsible for the supply of the batteries, cables and lamps, these products being of the Company's own manufacture. The 40-cell diesel starting battery has a capacity of 165 amp-hours at 5-hr rate. The cables are single varnished cambric insulated and served so as to be oil resistant and flame resistant.

Smoke Abatement Conference

ALL aspects of the Government's Clean Air Bill received attention at the annual conference of the National Smoke Abatement Society, held in Bournemouth at the end of last week. The President, Sir Ernest Smith, said that the Beaver Committee report was largely an elaboration of the views of an informed body of opinion throughout the country that had been developed over the years by the Society. In the future, the Society's tasks should include observing the working of the Bill when it became law, and the "gingering up" of inactive local authorities and the Government departments.

Papers read to the conference included two describing the Westminster district heating scheme, and these have already been the subject of comment in these columns. Floor heating, using embedded electric cables, was dealt with by Mr J. W. Moule, of the South of Scotland E.B. Amongst the points he made was that electric floor heating, along with other off-peak loads, will become even more desirable in the national interest. He was confident that there would be a great expansion in its use during the next few years.

Other papers gave close attention to the problems likely to be met by local authorities in administering a Clean Air Act.

Process Control Systems

Instrument and Chemical Engineers discuss Theory and Practice of Automatic Gear

YESTERDAY the Society of Instrument Technology and the Institution of Chemical Engineers joined together in holding a conference on Automatic Control in the Process Industries. This covered broadly the majority of automatic control systems, both in theory and in practice.

First of the papers, by Mr R. S. Medlock, of George Kent Ltd., was devoted to the "Fundamentals of Automatic Process Control." A simplified non-mathematical introduction to the theory was given, and the basic control system described, emphasing the importance of the feed back loop. It was shown that in many cases the characteristic of a response of a particular plant could be simulated by the use of an electrical analogue, and time lags could often be represented by a series of resistance capacity networks. The stability of a system, particularly as far as hunting or oscillation with increasing amplitude were concerned was discussed at some length, and the author then went on to consider characteristics of detecting elements and of controlling units, finally dealing with the problem of matching the controlling unit to the plant.

Dynamics of Process Plant

The dynamic characteristics of a process plant determine its controllability and methods of analysing this were contained in a paper by Mr J. McMillan of I.C.I. For quantitive analysis of dynamic characteristics, a study needed to be made of the relationship between known changes of process conditions and the resultant responses of dependent process conditions. Any form of "input" change could be used—pulse, step, ramp or sinuosoidal, but in process plant the step and sinuosoidal input were most widely used. The simplest elements were those producing distance-velocity and exponential lag. The derivation and use of the frequency response diagram was explained and its application to practical cases demonstrated.

The design of basic chemical plant so that best results could be obtained from automatic control by instruments formed the subject of the paper "Automatic Control and Chemical Engineering," by Messrs B. W. Balls and A. H. Isaac, of Foxboro-Yoxall Ltd. The paper gave several examples where redesign could greatly improve the amount of controllability of a system.

Applications

A series of four papers giving specific industrial applications of control equipment then followed. Mr B. O. Smith (B.I.S.R.A.) dealt with the steel industry with particular emphasis on furnace control, while Mr W. A. Goldstein (Bakelite Ltd.) was more concerned with automatic control of batch processes. Here the problem was complicated by changing operating conditions during the period while the reaction was taking place. It was also most desirable to use a programme controller in order to cut down the loading and discharge times to a minimum. To illustrate the development of automatic control to a batch process, the author took a hypothetical case which consisted of the charging of two or more raw materials to the process equipment, a period of heating under temperature control, a period of cooling under pressure control and the discharge of finished product into a storage receiver.

The author pointed out that the main weakness of existing batch process control systems was that control was only exercised on secondary variable such as temperature and pressure, and although the composition or quality of the materials processed was available from separate analysis, corrective action was only applied indirectly. What was required was the development of industrial type equipment for automatic chemical analysis of materials, and the continuous measurement of such physical quantities as viscosity and turbidity.

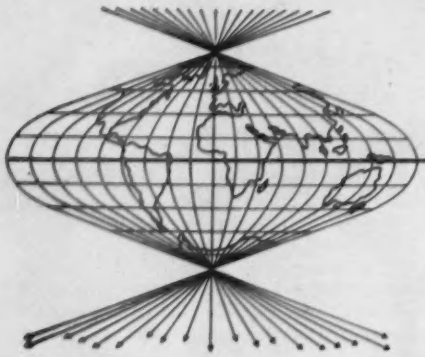
Temperature control of large storage tanks was dealt with by Mr W. A. J. Preece, of Shell. Here the difficulty was that the parameter to be measured, i.e. the temperature of oil in the tank had no single value, and the location of the measuring device was thus of considerable importance. The location should be such that a reliable indication was available, even with the tank partially empty and that it should indicate as far as possible the lowest temperature in the tank, whether the tank itself was heating up or cooling (eliminating, of course, local low temperature areas). The paper continued by discussing methods and rates of heating, circulation of liquids within the tank and effects such as variation of viscosity.

The last industry to be described was that of pulp and paper by Mr N. C. Underwood (Bowaters). This industry uses a considerable amount of electric power, to drive the various sections of the paper-making machinery. A number of systems had been developed for ensuring co-ordination between the motors, some of which had to drive high inertia machines and others low inertia plant. The dynamic performance of the system was thus highly complex.

The speed of the machine might be referred to a system of stable d.c. voltages—as used in many electronically-controlled drives; to the frequency of the a.c. supply, or to the electrical resistance of one of the windings of a small electric motor. Recent experimental work had shown that the basic weight of the paper made by one paper machine was influenced by frequency variation of the power house supply. When one small motor-alternator set generating the master reference a.c. supply for the machine was fed from a stable frequency supply, this influence disappeared. A highly stable frequency supply was installed in which the alternator was roughly speed-controlled by reference to a neon discharge tube and was precisely position-controlled by reference to a 400 c/s quartz crystal oscillator.

Again the author emphasised the lack of data on testing methods for dynamic response of large-scale systems, although the techniques were well established in the light electrical engineering industry.

Economies of process control in the petroleum industry were considered by Mr S. W. J. Walles, of the B.P. Co., and the "Development of Modern Control Technique and Pattern of Future Development" was the subject of Mr A. J. Young's remarks (I.C.I.).



OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

Transport for Montreal

Montreal is the centre of arguments concerning proposals for a future transport system. Whereas the city had a population of 250,000 in 1900, the figure is 1,500,000 now and is expected to reach 2,200,000 by 1970. The Montreal Transport Commission favours the construction of a subway, but the city planning director wants the Council to consider proposals for an overhead monorail system. He suggests a single line of T-shaped columns about 30 ft high and spaced from 60 to 80 ft apart, which would support two continuous girders. The latter would enclose rails on which the cars would be suspended. The car bottoms would clear the roadway by 15 ft. He referred to the monorail system at Wappertal, in Germany, which has been in operation for many years. But other officials are more strongly inclined towards the idea of the subway as a means of solving Montreal's mass transportation problem.

New Factory

Crompton Parkinson Canada Ltd. have now placed a contract for the erection of their new switchgear factory at Brantford, Ontario, to which we have already referred. The new factory will cover the complete range of switchgear developed by the British concern, we understand, with sales and service for all Canada being handled by the present Bepco Canada Ltd. organisation.

Ontario's Water Famine

Further evidence of the seriousness of the water shortage in Ontario has been given by Mr A. W. Manby, general manager of the Hydro-Electric Power Commission of Ontario. He said that Southern Ontario, which was itself the site of costly energy shortages, was now exporting power to Northern Ontario to help ease the power famine there, which stems from the record low water levels in some parts of the northland. Fortunately, the southern Ontario system has about a 10% reserve of energy. Despite the drought, this will be augmented by the completion this month of the last steam generator set at the Richard L. Hearn station, Toronto. Large concerns such as paper mills, with their own power plants, have also been hard hit by the water shortage, and one company, the Abitibi Power and Power Co., has arranged with a professional rainmaker to seed clouds in an effort to induce rainfalls.

U.S.A.

Prices Going Up?

An increase in prices of many types of U.S. heavy electrical equipment is foreshadowed by an announcement that General Electric are raising the prices of transformers and related equipment by 10%. Higher labour costs resulting from new wage agreements, and the rising prices of raw materials have dictated the increase. According to local reports, many other prominent electrical equipment manufacturers are closely examining the matter.

Assistance for Nuclear Power

In order to further the progress of commercial nuclear power, the U.S. Atomic Energy Commission has revealed plans to subsidise the construction of nuclear reactors for power purposes by smaller electrical utilities, including those in rural areas. The subsidy will involve meeting all or part of the cost of the reactors capable of producing between 5,000 kW and 40,000 kW. The projects will, of course, have to be approved as meeting certain basic criteria.

BARBADOS

Restoration

The power station plant and machinery of the Barbados Electric Supply Corporation Ltd. suffered only negligible damage in the recent hurricane, we are pleased to hear, but the overhead line system suffered rather severely. When warning was received of the immediate approach of the hurricane all possible precautions were taken, and the plant almost shutting down temporarily, but the latest despatches indicate that the station is in action again and 60% of the load has been restored. Mr Baker, secretary of the company, and additional engineering staff have gone out to Barbados to help provide any further assistance required in completely restoring all services, and obtaining a complete picture of the damage suffered in the hurricane—the first to touch Barbados for a hundred years. Assistance has also been provided to certain areas through the Colonial Office who last week arranged for the despatch of seven small generating sets by Dale Electric (Yorkshire) Ltd. The sets were shipped last week.

SCANDINAVIA

Large H.E. Scheme

Norway's largest reserve of water power—at Tokke in Telemark, south-east Norway—is now to be utilised in the production of electricity. The Government has announced that it will ask Parliament this autumn to make an initial appropriation to cover the cost of preparatory work on the site. The proposed hydro-electric station at Tokke will be the largest in Norway, and among the biggest in the world. The aim in the first phase is to achieve a generating capacity of 400 MW, to give an annual output of 2,000 million units. Ultimate capacity has been put at 700 MW. Cost of construction of the first phase is estimated at £20 millions, and the Norwegian Government has already had talks with the International Bank for Reconstruction with regard to a loan for the proposed development.

Market for Insulators

Japan has found a good market in Sweden for its insulators, it seems. During a recent visit of Mr A. Rusk, president of the Swedish Power Board, said that his country would purchase more insulators from Japan in the future. Over 7% of the 2 million insulators now in use in Sweden were supplied by the Japan Insulators Co., and Sweden would need 50,000 to 100,000 insulators annually, he said.

EUROPE

Scheme Completed

One of Yugoslavia's largest hydro-electric plants, at Lokve, was completed recently. The plant, which will have an estimated annual output of about 200 million units, has taken ten years to build.

Future Needs

The question of obtaining the necessary finance to promote the construction

of the additional power plant which will be needed to meet demands beyond 1958, has again been raised in Italy, we learn. It is the opinion of many officials in the supply industry that the present charges for electricity are too low, and that the only way to ensure sufficient supplies of power for the future is to bring prices into line with construction and operating costs. This is a matter on which Governmental guidance is being sought. The Italian Minister of Public Works recently stated that the electricity supply industry was at present in a satisfactory position both financially and technically, and additional plant was under construction which would provide a further 7,000 million units per annum, of which 90% would be hydro-electric. It is estimated that these plants will meet Italy's power requirements up to 1957, but the need now is for further future planning.

AFRICA

Further Plant

A new hydro-electric station at Boali in French Equatorial Africa, 50 miles to the North of Bangui, the capital of the territory of Ubanghi-Shari, has been opened by the Governor-General. The installed capacity is 3,200 kW, but this can be doubled later if necessary. The new station will supply current for the town of Bangui and for a textile factory recently established at Boali. Meanwhile interest is still centred on the proposed large-scale hydro-electric scheme on the Kouliou River (the site is about 30 miles from the mouth of the river and about 55 miles North of Pointe Noire).

More Power for Mombasa

The first of two 5,000 kW turbo-alternators is expected to be installed at the Kipevu power station of the East African Power and Lighting Co. by the beginning of next year. The second will be ready later in the year. Work on the station, which will supply Mombasa, was started by the company in Oct. 1954.

S.W. ASIA

Continued Protection

The Government of Pakistan, on the recommendation of the Tariff Commission, have decided to grant extension of the period of protection to the industrial type power switchboard industry for a further period ending 31 Dec., 1955. The measures of assistance granted to the industry earlier will continue.

Heavy Electrical Plant

The Government of India has decided to appoint Associated Electrical Industries Ltd. as consultants for the establishment of its proposed heavy electrical equipment factory, it is reported from New Delhi. AEI. Ltd. are apparently to advise the Government on the erection and equipment of the plant and on details of design and manufacturing methods.

Burma Project

Construction of a new hydro-electric project near Loikan, capital of Kayah State, Burma, is to be undertaken by two Japanese engineering concerns, under the reparations agreement. The contracts, valued at £1,198,000, were completed between the Burmese Government and the two firms last week. One contract provides for the Kajima Construction Co. to build the plant and installations at the site, about 200 miles north east of Rangoon, at a cost of £873,000, the Japanese Government meeting £713,000 of the cost under the reparations agreement. Under the other contract Nippon Ko-Ei Kabushi Kaisha undertakes to erect a power line from the site of the project to Rangoon at a cost of £325,000. Of this, the Japanese Government will pay £250,000 under the reparations agreement with Burma.

Inquiry Aim

Further to our note on 18 Aug. reporting the setting up of a committee by the Government of Rajasthan to inquire into the conditions of the electricity supply industry in the State, it is now revealed that it is the government's intention to bring all the undertakings under the administrative control of a State Corporation with a 41% government investment.

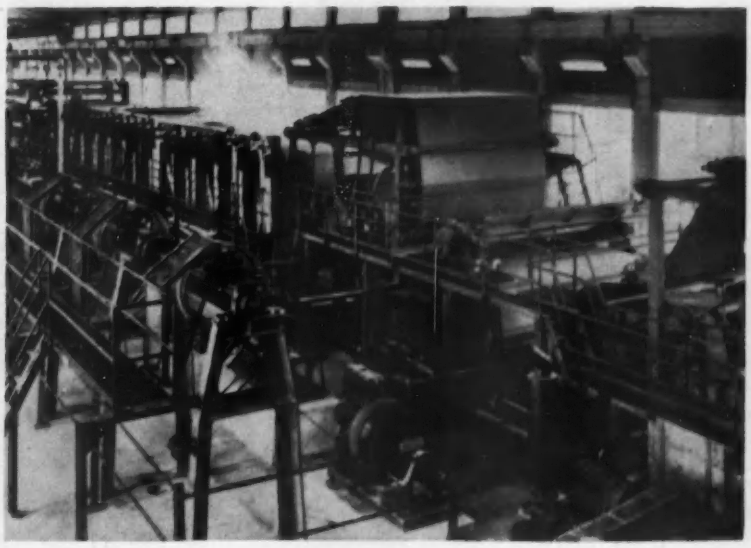
AUSTRALIA

W.A. Surplus

After charging interest and depreciation, operations of the State Electricity Commission of Western Australia resulted in a surplus of £222,000 last year, we learn. The Commission has now cleared its accumulated losses since 1949. But taking into account its capitalisation of £20 millions, and an annual revenue of £6 millions, the Commission considers that the surplus is a very slender margin of profit. The surplus figure was arrived at after taking into account a Treasury contribution of £72,000 to a loss of £80,000 on the South-West power scheme. Coal is the commission's largest expenditure item, but as from 1 Jan. next, the Commission hopes to get competitive tenders for all its coal requirements.

Approach to Nuclear Power

The Electricity Commission of New South Wales—the power generating and bulk supply authority in the State—is approaching cautiously the matter of using nuclear energy as a source of production of electric power. The vice-chairman of the Commission, Mr V. J. F. Brain, and the chief engineer, generation, Mr F. Sykes, recently attended the United Nations conference at Geneva, and have also made investigations on the matter in the United States, the U.K. and Europe. Being chiefly concerned with comparative costs of power generation, the Commission is biding its time, waiting for nuclear power to become a practicable commercial proposition. Its views to this effect were recently expressed in a letter to Sydney County Council.



For the newly completed cardboard manufacturing factory of South African Board Mills Ltd., in the Transvaal, Crompton Parkinson Ltd. supplied a Ward Leonard set comprising an auto-synchronous a.c. motor direct coupled to a d.c. generator which in turn controls the 240 h.p. main motor. The Ward Leonard system was necessary to achieve the high degree of control required and in fact gave a 6:1 speed range. The main motor drives direct the line shaft seen in our illustration alongside, from which plant in the various sections of the factory belt are driven. Coned pulleys are employed to provide fine adjustment facilities for the relative speeds of different items of plant. The motor-generator set is remote controlled and automatic dynamic breaking of the plant is provided when the main motor is switched off. Numerous C.P. motors were also supplied for auxiliary plant

Personalities

IN THE INDUSTRY

Professor Arnold Tustin, M.SC., M.I.E.E., who recently took up the Chair of Electrical Engineering at the Imperial College of Science, London University, has been appointed a member of the British Transport Commission's Research Advisory Council.

Chairman of Associated Electrical Industries Ltd., **Viscount Chandos**, D.S.O., M.C., P.C., has accepted the invitation of the Northern Ireland Government, to be chairman of the new Development Council formed with the British Government, whose aim is to promote new industries and reduce unemployment in Northern Ireland.

The British Central Electrical Co., Ltd., announces that **Mr T. A. Nash** has joined the company as a sales engineer. He served his apprenticeship with G. E. Taylor and Co., whom he rejoined after spending six years with the R.A.F. After leaving them in 1949, he worked for four years with Walsall Conduits Ltd., and then for two years with Howells Electric Motors at Stoke-on-Trent.

Further district reorganisation in the Northmet sub-area, involving new appointments, is announced by the Eastern Electricity Board. As from 1 Oct., the present districts of Hertford and Bishop's Stortford have been merged, the combined district being known as "Hertford," with district office at Bridgefoot, Ware. Manager of this new district is **Mr W. H. Hatton-Ward**, ASSOC.I.E.E., who was previously manager of the Board's Bishop's Stortford district. In addition, **Mr F. J. Drake**, ASSOC.I.E.E., until recently district manager of Hertford, has been appointed to a similar position for the St Albans district in succession to **Mr R. A. Voit**, M.I.E.E., who has become district manager for Wood Green on the retirement at the end of Sept. of **Mr W. R. B. Wood**, ASSOC.I.E.E. Mr Wood joined the Northmet Power Co. in 1920 as an assistant engineer, and in 1926 was appointed resident engineer at Chingford. In 1947 he became district superintendent, Southgate, continuing in that capacity until the Southgate and Wood Green districts were merged in April, 1951, when he was nominated district manager of the combined district. Following his retirement, Mr and Mrs Wood propose to live in Wigtownshire, we understand. Mr Hatton-Ward, manager of the new Hertford district, started with the Northmet Power Co. as a junior engineer at Brimsdown in 1925. From 1930 to 1937 he was resident engineer at Hoddesdon, after which he was district superintendent at Bishop's Stortford until 1948 when he became district manager there. Mr Drake, now district manager at St Albans, has held a similar position at Hertford since April, 1952. He was previously district manager at Royston for 21 years, going there from Stevenage where he was first assistant with the Stevenage Electric Light and Power Co. The new district manager at Wood Green, Mr Voigt, joined the Northmet Power Co. as assistant engineer at Hoddesdon in 1926, and became chief assistant, Hertford, in 1932. He was appointed district superintendent at St. Albans in 1937, later becoming district manager of the St Albans and Welwyn Garden City district.

Mr Leslie Gamage, vice-chairman and joint managing director of the General Electric Co., who is also chairman of British Overseas Fairs Ltd., and president of the Institute of Export, flew to Copenhagen last week to attend the British Trade Fair. Mr Gamage, who was accompanied by the Hon. Mrs Leslie Gamage, is remaining in Scandinavia for over a fortnight, spending several days on business in Oslo and Stockholm.

The Lord President of the Council has appointed **Prof P. M. S. Blackett**, M.A., F.R.S., Professor of Physics, Imperial College of Science and Technology, and **Mr H. Douglass**, General Secretary of the Iron and Steel Trades Confederation, to be members of the Advisory Council for Scientific and Industrial Research from 1 Oct. **Mr J. Crawford**, J.P., **Prof T. R. C. Fox**, M.I.MECH.E., M.I. CHEM.E., and **Sir George Thomson**, D.SC., LL.D., F.R.S., retired from the Council on 30 Sept., on completion of their terms of office.

Mr W. Todd, chief administrative officer to the North Western Electricity Board at Rochdale, retired a few days ago after 51 years with the local undertaking.

Mr W. Kupfer, director of W. and E. Kupfer Ltd., the parent company of the British General Manufacturing Co. (1941) Ltd., is leaving for a Far East business tour early in January. His itinerary includes Pakistan, India, Ceylon, Burma, Siam, Malaya and Hong Kong.

Major Cyril Dennis, who joined W. B. Dick and Co. in 1920, is retiring from his executive offices at the year end. He will, however, continue as an ordinary director of the company, which is the principal subsidiary of C. C. Wakefield and Co.

The Minister of Fuel and Power has appointed **Councillor A. D. H. Plummer**, T.D., F.A.I., as a member of the London Electricity Consultative Council. **Councillor E. E. Jennings**, F.C.P.A., recently retired from the Council on completion of his term of office.

Just appointed assistant sales manager of Chloride Batteries Ltd. is **Mr A. C. Stewart**, who has been manager of the Drydex Department for the past 24 years. Mr Stewart, who will be working under the direction of **Mr E. Powell**, director and sales manager of the company, joined Chloride in Mar., 1921, when, after training, he was appointed

Mr T. A. Nash

Mr W. H. Hatton-Ward

Mr F. J. Drake

Mr W. R. B. Wood

Mr A. C. Stewart

service manager at the Exide Works at Clifton Junction. In 1923 he became the company's representative in south west England, being primarily concerned with stationary batteries. A year later he was appointed manager of the newly-opened Bristol Exide depot, taking up the function of area sales manager at the same time. He remained at Bristol until 1931, when he was recalled to head office in London to become manager of the Drydex Department.

Mr G. A. Plummer

Mr D. C. Altman

Mr G. A. Plummer, M.I.MECH.E., M.I.MAR.E., M.A.S.M.E., has been appointed to the main board of John Thompson Ltd. Mr Plummer is, and will continue as, a director and chief engineer of John Thompson Water Tube Boilers Ltd., one of the group of companies controlled by John Thompson Ltd. In recent years he had been concerned with the company's nuclear power projects, and will continue in that capacity.

Mr Donald C. Altman has recently arrived from the United States to assume the post of sales manager, Industries Group, Allis-Chalmers (Gt Britain) Ltd.

Mr F. H. Mann, M.I.E.E., last month retired from the position of senior electrical inspector of factories, Ministry of Labour and National Service. We understand that he is taking up consulting work on his own account. Readers will recall his series of articles on earthing which he contributed to our pages last year. His successor as senior electrical inspector of factories is **Mr S. J. Emerson,** M.ENG., A.M.I.E.E., who since Feb., 1954, has been deputy to Mr Mann. Mr Emerson served with the Mersey Power Co. before joining the Home Office in 1931. During the last war he was for 6¼ years in the R.E.'s, being for some time deputy chief engineer with S.E.A.C., chief engineer of an airfield development group, and, for a period, director of machinery, India Command.

Mr Arthur Bull, an executive director and one of the chief sales executives of Oldham and Son Ltd., flew from London to India last week.

Chairman and managing director of Ultra Electric Ltd., **Mr E. E. Rosen,** flew to America last Thursday on a month's business visit.

To mark the completion of half a century as a director of the Expanded Metal Co., Ltd., a presentation has been made to **Mr J. G. Buchanan,** J.P., M.INST.MET., M.I.STRUCT.E. The presentation was made on behalf of the board by **Lieutenant Commander G. C. Hans Hamilton,** chairman of the company. Mr Buchanan, who is also chairman of William Jacks and Co., first became associated with the Expanded Metal Co. in 1903, when he established markets for its products in India, Burma and Malaya.

The many friends of **Mr Clifford P. N. Rand,** M.A., M.I.E.E., A.M.I.MECH.E., will be pleased to learn that he has now fully recovered from his two years' illness and has rejoined his old company, Electrical and Engineering Products Ltd., who are in association with Bonar Long and Co.

The E.A.W. Diploma in Electrical Housecraft has been awarded to **Miss E. P. Barker,** of Sale, Cheshire, Merseyside and North Wales Electricity Board. Miss Barker gained a 1st Class pass in cookery demonstration and salesmanship, and distinction in laundry demonstration.

Mr T. G. F. Atherton, M.A. (CANTAB) has been elected to the boards of Dorman and Smith Ltd., D. S. Plugs Ltd., and British Klockner Switchgear Ltd.

It is announced that **Mr F. J. Pascoe** has been appointed chairman of Aberdare Cables (Holdings) Ltd., with **Mr J. P. Gilliver** and **Mr A. J. Nicholas** as joint managing directors. Mr Pascoe, who has been a director of the company since its inception, is also chairman and managing director of British Timken Ltd. Mr Gilliver has been a director and secretary of the company for some years past, while Mr Nicholas, a director of the company, is also managing director of South Wales Switchgear Ltd.

Mr W. L. Brown has been elected to the Board of Hackbridge Cable Holdings Ltd. and appointed managing director in succession to **Mr C. W. Bloomfield** whose retirement from that position we noted on 8 Sept. Mr Brown, who is also a director of Siemens-Schuckert (Gt. Britain) Ltd., has had extensive experience on the administrative side of the cable industry.

Joining Siemens Electric Lamps and Supplies Ltd. as a laboratory assistant 35 years ago, **Dr J. N. Aldington,** J.P., B.SC., PH.D., F.R.I.C., F.INST.P., F.I.E.S., M.I.E.E., managing director of the company, recently said farewell to staff and workers at the Preston Works. Leaving Preston to take up his new appointment as managing director of Siemens Bros., Ltd., **Mr P. D. Oakley,** general works manager, presented Dr Aldington with an illuminated address. **Mr W. Higginson,** on behalf of the staff, presented him with a gold watch; a silver entree dish was also presented to **Mrs Aldington.**

Mr H. L. Smith, commercial director and **Mr L. R. Kavanagh,** works director, of the Benjamin Electric Ltd., left London Airport on 30 Sept., for an extended tour of the United States, to study technical and commercial developments in connection with their company's extension programme, with particular emphasis on the development of vitreous enamelling, engineering and new plant.

Mr A. D. Smart, C.A., present chief accountant, has been appointed secretary of the British Oxygen Co., Ltd., as from 1 Oct., in place of **Mr H. Coburn,** A.C.A.

Previously general sales manager of Electronic Tubes Ltd., **Mr A. J. Morley** has this week taken up his new appointment with Thorn Electrical Industries Ltd. (we were earlier informed that he joined them on 1 Sept.).

Principal of the Borough Polytechnic since 1933, **Dr D. H. Ingall,** D.SC., F.R.I.C., F.INST.P., HON.M.I.H.V.E., is to retire from that position on 31 Aug., 1956, we understand.

Sir William Halcrow and Partners announce that **Sir William Halcrow,** M.INST.C.E., M.I.MECH.E., M.I.W.E., has retired from the partnership. He will continue to be associated with the firm as a consultant. Throughout his long career, Sir William has been concerned with a large number of hydro-electric schemes, construction of steam power stations, and similar work. Recent projects include the Kariba and Kafue schemes in Rhodesia, and the Volta River development plan. He has also advised the New Zealand Government on proposals for underground railways in Auckland. Earlier, he was associated with numerous hydro-electric projects in Scotland.

OBITUARY

Mr R. A. Johnson, A.M.I.E.E., who took up the post of station superintendent at Cowes power station, Isle of Wight, earlier this year, died on 23 Sept., aged 55. Mr Johnson was apprenticed to the Swansea Harbour Trust before going to Burnley in 1920 as a junior charge engineer. From 1925 to 1947 he was at Doncaster generating station, holding various posts, ultimately as station superintendent, and in 1948 became shift charge engineer at Portsmouth. There, he was boiler operation engineer from 1951 to 1953 when he became deputy station superintendent at Wolverhampton, the position he left early this year to go to Cowes.

Mr G. S. Sommerville, A.M.I.E.E., borough electrical engineer at Faversham until his retirement in 1946, died on 18 Sept. It was in 1900 that the Faversham Borough Council decided to have an electricity generating plant, and Mr. Sommerville went from London to become the first borough electrical engineer there.

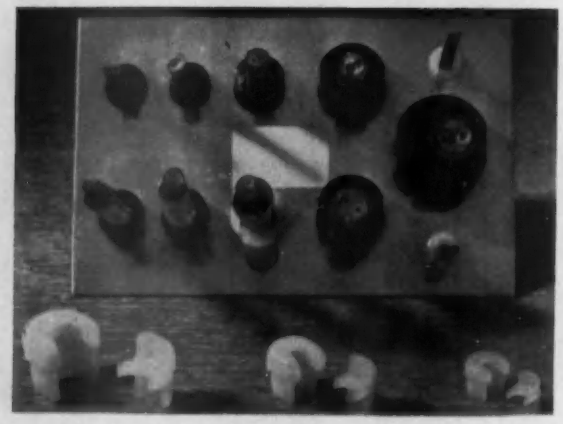
Equipment for Industry

New Cable Strain Relief Bushes

SEVERAL new types of strain relief bushes which avoid cable fraying and enable supply cables to be securely anchored at the entrance point to an instrument chassis or tool, have been introduced recently by INJECTION MOULDERS LTD., Westmoreland Rd, N.W.9. The standard bush consists of two nylon sections which mate tightly about the cable, the bushing then may be snapped into a chassis hole of the correct size. By virtue of the method and material employed, these bushes are said to impart a positive non-slip insulating grip and eliminate wire deterioration at the entrance to the apparatus housing. Another bush in the wide range available is the spring "Heycos" suitable for portable tools where excessive flexing might injure the supply cable.

Similar to the standard bush, the two-piece spring "Heycos" can be placed on the wire at the desired point and inserted into the hole which has been previously drilled in the metal case. The non-brittle property of nylon permits a close coupling of the spring to bush which adds to the efficiency and appearance of this fitting.

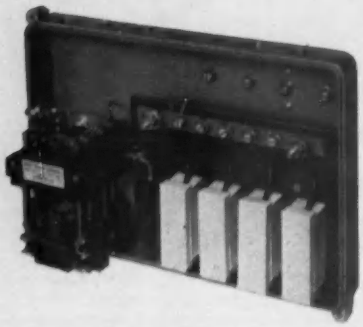
Designed to absorb cable pull, push and torque, the "Heycos" range caters for wire diameters of up to 11/16 in



This illustrates the wide range of "Heycos" nylon strain relief bushes

Controlling Thermal Storage Heaters

BELIEVED to be the only unit specifically designed for the control of thermal storage heating, the new distribution contactor produced by BRITISH KLOCKNER SWITCHGEAR LTD., Chertsey, Surrey, comprises a single-phase contactor with four outgoing circuits, each individually fused with a neutral bar. Groups of heaters operating on single-



The new B.K.S. distribution contactor as seen with its cover removed

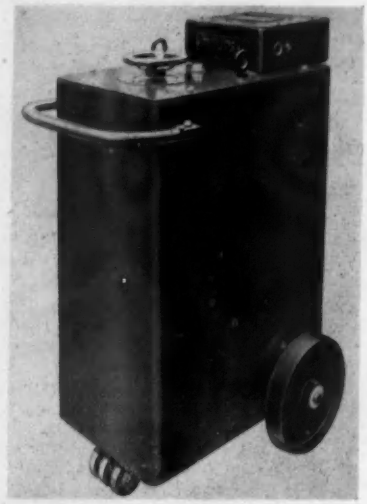
phase may be switched and the equipment combines the functions of a separate contactor, distribution board and control fuse in one simple compact unit. It can be utilised in any situation where groups of heaters on one phase are required to be controlled by time switch or thermostat. Installation procedure and wiring costs are reduced to a minimum by intelligent design, all internal wiring being complete and terminals provided for speedy, simple wiring of external apparatus. Contained in a dust-proof, aluminium die-cast case measuring 12¼ in. x 8¼ in. x 5 in., the distribution contactor caters for the following conduit entries, one 1 in. incoming, four ¾ in. outgoing and one ¾ in. for control. The outgoing circuits are rated at 20 amp, each having a single pole rewirable fuseway and solid neutral terminals adequate for 7/0·029 in. cables.

Decade Counter employs Transistors

RAPID improvement in manufacturing technique of transistors has led to their introduction in electronic applications where previously thermionic valves suffered no competition. The latest advance in the electronics field by transistors is an experimental decade counter constructed by MULLARD LTD., Shaftesbury Ave, W.C.2, and employing junction-type transistors. Having a counting speed of 100,000 per second with a resolution time of 10 microsec, this latest transistor device including batteries, occupies a space of only 10 in. x 8 in. x 5 in. Total power consumption of the counter 100 mA at 6 V, is less than that required to supply the heater of a single thermionic valve used in computors. Decade counters such as this could form the basic units of many counting and computing devices especially in portable equipment and in large computors where problems of size and heat dissipation arise. Employed as a frequency divider, the counter possesses the advantage that under fault conditions the counter ceases to work.

New Arc Welding Transformers

TWO new oil-cooled transformers suitable for medium and heavy fabrication work have been recently introduced by PHILIPS ELECTRICAL LTD., Shaftesbury Ave, W.C.2. Constructed in accordance with B.S.638, the two transformers are



One of the two new Philips oil-cooled transformers. This is the ES. 1486

referenced type 1485 and 1486. In both cases, welding currents are selected by means of a positive-action, heavy duty rotary switch in conjunction with high and low range output terminals. A single handwheel adjusts the output which may be read directly from a clear circular scale. Both transformers are adjustable by 1 amp steps in the low current range, but in the high range type 1485 may be varied in steps of 10/15 amp and 10/20 amp in the case of heavier units. Maximum continuous welding currents according to B.S. rating, are given as 250 amp and 350 amp respectively for the 1485 and 1486. All components are housed in a heavy gauge mild steel tank, totally enclosed and oil immersed.

Get Ready for the Winter Rush on Isoblankets !

LEAFLETS on the new season's range of electric blankets which ISOPAD LTD., 30-32 Rosemont Rd, Hampstead, N.W.3, are marketing in time for winter demand, show that their Isoblanket "Lana" which, made of pure wool and designed to be tucked in all round the bed, is again made in two sizes 60 in. x 80 in. overall, but with heated section now increased from 30 in. to 36 in. x 54 in., it costs £10. 7s. 9d. retail. The double bed size, 70 in. x 80 in. is now made with two separate three-heat controls so that

The "Lana" now has independent heat control for either side

each sleeper can arrange the heat to his or her liking.

There are also available the single and three-heat blankets selling at £5. 13s. 4d. and £7. 16s. 3d. respectively, as well as the Iscpad Master three-heat pad for £4. 19s. 2d. All Isoblankets are now constructed in accordance with British Standard Specifications and are available for either 210/220 V or 230/240 V supplies, a.c./d.c.

Hotpoint companies reduce Prices

PRICE reductions are announced by two sections of the Hotpoint organisation with effect from 1 Oct., 1955.

In the first case the HOTPOINT ELECTRIC APPLIANCE CO., LTD., Fletton, Peterborough, announces reductions in the prices of their range of *washing machines* as follows:

Model CG/P (AC mains) from £81. 6s. 4d. to £76. 9s.
Model CG/P (DC mains) from £84. 15s. 10d. to £79. 18s. 6d.
Model CH (heated, AC mains) from £91. 14s. 10d. to £86. 17s. 6d.

The COLDRATOR DIVISION announce price reductions for their *refrigerators* as under:

Domestic Refrigerators.
CT.33 from 65 gns. to 63 gns.
CT.45 from 94 gns. to 79 gns.
CS.71 from 128 gns. to 114 gns.
Service Cabinets.
DS.130 £145 to £137. 10s.
DS.180 £185 to £177. 10s.
All prices include purchase tax.

Hoover Toys this year include Washing Machine Model

ONCE again realistic toy models of several Hoover appliances will be on sale in toy shops for Christmas.

Newcomer this year is a model of the MK II washing machine which, measuring 11 in. x 6¾ in. and looking just like the real thing, really does wash "quickly, gently and thoroughly." Priced £2. 2s. retail this working model is made by Mettoy Ltd., Swansea.

The toy Hoover cleaner based on the 612 model works when pushed along, by suction, and a brush roll helps beat the carpet. Price is 29s. 6d. retail and makers Wells-Brimtoy Distributors Ltd., Progress Works, Stirling Rd, E.17.

Two other toys are the battery powered working model of Hoover's "Dustette" by the Ever-Ready Co. (Great Britain) Ltd., Hercules Place, N.7, and costing 12s. 9d. and a toy Hoover Steam Iron priced 7s. 11d. retail and made by Die Casting Machine Tools Ltd., 152 Green Lanes, N.13.

Fluvent Switchgear Designed as Architects Conception

BEHIND the design of a recently introduced range of "Fluvent" cabinet style fuseboards has been the desire of the makers PARMITER, HOPE AND SUGDEN LTD., Fluvent Works, Manchester 12, to produce a unit which could be placed in an easily accessible place, as its nature demanded, without giving offence to those concerned with aesthetic values or as, to quote the firm, "an architect's concept of electrical gear."

These fuseboards have no projections or excrescences of any kind save a simple door catch. All edges are rounded to a uniform radius, the lid is sunk flush and the hinges are invisible. Particular attention has been paid to the finish; the pressed steel cabinets are heavily cadmium plated all over and a pleasant finish is obtained by a special "beaten metal" paint. This neutral grey finish will take any paint which is being applied to the surroundings as it affords sufficient "key." Alternatively, the boards may be had with the cadmium plated finish only, this again being a suitable base for any subsequent decorative medium.

The use of the sunk lid has enabled the user of an internal hinge providing a 180° door swing for easy access to the fuse gear which in the primary range of boards, covers the standard ranges of 15 and 30 A sizes in S.P. and N.; D.P., T.P., and T.P. and N., form including an S.P. and N. split-phase form suitable for wiring 2-wire and 4-wire incoming.

Whilst these boards are not watertight every attention has been paid in the design to water exclusion. All boards incidentally are fitted with Aeroflex Category 440 AC5 high breaking capacity fuses to BS88:1952 Standard fully wired cartridge fuse links are included unless otherwise specified.

For the Electrical Trade

New MK Fused Connector-Box with Earthing Facilities

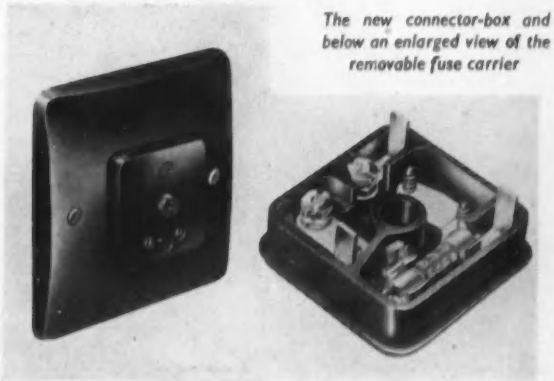
THIS new accessory has been designed and made by M.K. ELECTRIC LTD., Wakefield St, Edmonton, N.18, to enable clocks and similar fixed appliances to be looped from a ring circuit. The generous and well-positioned terminals accommodate 7/·029 in. cable, and there is provision for earthing.

A cartridge fuse link rated 1 A to BS.646:1944 Type A is housed in the removable carrier, which is fitted with a flex-grip.

The 2¼ in. fixing centres enable the accessory to be mounted in standard boxes to BS1363, and if required, the extremely shallow back projection will fit into a plaster-depth box to avoid the need for chasing brickwork. List No. 999, Brown 70s. dozen, Ivory 75s. dozen.

Philishave ITA card link

NEW Price Card designed to fit into the open lid of the "Philishave" pack draws attention to the advertising film currently shown on commercial television.



The new connector-box and below an enlarged view of the removable fuse carrier

TRADE PUBLICATIONS

NICKEL PLATING.—An illustrated booklet describing the properties of Kanigen plate has been received from Albright and Wilson Ltd., 49 Park Lane, W.1.

LAMPS AND LIGHTING.—New season's literature from Ekco-Ensign Electric Ltd., 45 Essex St, London, W.C.2, includes leaflets on fluorescent fittings. A broadsheet showing the range of both tungsten and fluorescent fittings and control gear, a price list and a price list and catalogue of lamps and fittings dated Sept., 1955.

BOILERS AND EQUIPMENT.—Babcock and Wilcox Ltd., Babcock House, Farringdon St, E.C.4, have issued three new publications, No. 1591/1 describing "Unidirectional" retractable soot blowers, No. 1597 describing Babcock's shot cleaning system for boiler plant, No. 1629 describing the "Steambloc" packaged boiler.

STUD WELDING.—Four new illustrated pamphlets issued by Crompton Parkinson Ltd., Crompton Hse, Aldwych, W.C.2, describe the principles of Cyc-Arc and Nelson precision stud welding equipment and their application to industry.

FLUOROCARBONS.—New brochure describing Ediswan Clix Fluorocarbons is available from the Edison Swan Electric Co., Ltd., 155 Charing Cross Rd, W.C.2.

CABLES.—New publication E.N.111 has been issued by Enfield Cables Ltd., Victoria Hse, Southampton Row, W.C.1. It deals with high voltage jointing accessories.

SWITCHGEAR.—List L.530 deals with "Heavy Industrial" Distribution Switchgear made by Lancashire Dynamo Switchgear Ltd., Trafford Pk, Manchester.

SWITCHES.—Rolls Switches Ltd., 154/6 Blackfriars Rd, S.E.1, have issued a new catalogue describing their products.

PLASTICS.—Concise technical information on the complete range of Geon Vinyl Resins, Latices and compounds is now available from British Geon Ltd., Devonshire Hse, Piccadilly, London, W.1.

ALUMINIUM.—The Aluminium Centenary Exhibition is the main feature of the September issue of *Aluminium Courier* issued by the Aluminium Development Association, 33 Grosvenor St, London, W.1.

WELDING.—Two new booklets issued by Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester 17, described the Metrovick ranges of resistance and arc welding equipment.

TELECOMMUNICATIONS.—Type 100 telephone meter is the subject of Engineering Bulletin 2318 issued by Automatic Telephone and Electric Co., Ltd., London and Liverpool.

LIGHTING.—New brochure describing their D.C. Fluorescent Transport lighting system has been published by Philips Electrical Ltd., Century House, Shaftesbury Ave, W.C.2.

RESINS.—Summary sheet just issued by British Resin Products Ltd., Devonshire House, Piccadilly, W.1, gives details of the complete range of Cellobond rubber compounding resins now available.

TRANSFORMERS.—Latest issue of the "Variac" transformer catalogue issued by Zenith Electric Co., Ltd., Villiers Rd, Willesden Green, N.W.2, includes new models which will be described in forthcoming issues of the ELECTRICAL TIMES. This catalogue has also been sent to us by Claude Lyons Ltd., 4-10 Ware Rd, Hoddesdon, Herts.

50,000 fluorescent tubes a week is Scemco's target for next May

FAST selling idea used by Scemco Ltd., to introduce the range of fluorescent lamps they are now making and marketing, are sample packs containing twelve lamps of various colours in quantities related to their popularity.

Two years' planning behind this new venture of Scemco's has culminated in the production of 10,000 fluorescent tubes per week. Mr John Wear, managing director, told ELECTRICAL TIMES that he hopes to increase this output to 50,000 a week by next May. Consequent on this achievement Mr Wear aims to bring to the public by June 1956 a 5 ft, 80 W, lamp selling at 10s. 6d. and a 4 ft, 40 W, size at 9s. 6d.

The new range is available in seven phosphor colours—warm white, white, daylight, natural, north light, colour matching and peach in seven sizes, 5 ft, 80 W; 4 ft, 40 W; 3 ft, 30 W; 2 ft, 40 W; 2 ft, 20 W; 1 ft 6 in., 15 W; 1 ft, 10 W (this size only in warm white, white and daylight). Average efficiencies based on comparative photometry with lamps standardised by the National Physical Laboratory are quoted in the following table by the company.

The special sample pack which has been made up as a way of introducing the new lamp to dealers has had an unprecedented success. Composition of these packs (12 5 ft or 12 4 ft tubes) is as follows, 5 daylight, 3 warm white, 2 natural, 1 white and 1 peach. Prices of the complete range at the present moment are as under:

5 ft, 80 W, 11s. 6d., p.t. 1s. 10½d.
4 ft, 40 W, 10s. 6d., p.t. 1s. 8½d.
3 ft, 30 W, 10s., p.t. 1s. 7½d.
2 ft, 40 W, 10s., p.t. 1s. 7½d.
2 ft, 20 W, 9s. 9d., p.t. 1s. 7d.
18 in., 15 W, 9s. 3d., p.t. 1s. 6d.
12 in., 10 W, 9s., p.t. 1s. 5½d.

The latest catalogue issued by the firm is another example of the way in which they strive to help the trader. In pocket size wallet form the catalogue comprises a series of postcard illustrations of all fittings with specifications on the reverse. Each card is boldly numbered so that reference to that number of the price list gives immediately all price details relating to the fitting.

AVERAGE EFFICIENCIES OF SCEMCO FLUORESCENT LAMPS

Based on Comparative Photometry with Lamps Standardised by The National Physical Laboratory

				Lumens per Watt at 100 hours							Average Through Life LPW						
Length	Watts	Diam	Cap	Warm White	White	Day-light	Natural	North Light	Colour Matching	Peach	WW	W	DL	Nat	NL	CM	P
5 ft	80W	37 MM	BC BI PIN	57	56·5	52	49	50	43	48	51	49	45	38	37	33	40
4 ft	40W	..	..	61	59	55	53	53	46	50	53	52	48	41	40	36	43
3 ft	30W	..	..	53	53	50	40	42	42	47	48	48	46	40	37	37	40
2 ft	40W	..	..	40	40	38	31	31	31	35	33	33	31	25	25	25	29
2 ft	20W	..	..	46	46	44	36	36	36	40	40	40	38	32	31	31	35
18 in.	15W	..	..	40	40	38	40	40	40	38	34	34	33	30	30	30	29
12 in.	10W	27 MM	..	40	40	38											

PROBLEMS AND PRACTICE

In Engineering

Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

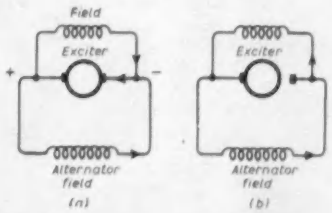
Showroom Lighting

THE planning and installation of fluorescent fittings in showrooms and shop windows has, in the majority of instances, reached a very high standard. Unfortunately, however, one still encounters installations which mainly through oversight are potentially a danger to the display they illuminate and are extremely difficult to service.

The chief offenders are the rows of fluorescent fittings in shop and display windows. Most of these have self-contained gear, and to effect repairs or replacement of the starter entails either working amongst, or removal of, the display, or alternatively a precarious journey over a false ceiling to service the gear from the top of the fitting. Moreover, should the p.f. capacitor or choke give trouble, these quite often drip on to expensive items in the window, much to the concern of the management. The answer, of course, is to use remote gear, housed in an accessible cupboard, coupled with complete replacement of all fluorescent lamps after a given period, to give an extremely sound installation and service. The foregoing methods, although more expensive, if explained to a potential client will show that the additional expense is fully justified and that their interests are being studied.—*W. Satchwill.*

Demagnetised Alternator

IN the 11 Aug. issue, Mr Mellanby describes the case of "Another Demagnetised Alternator." In fact, the story refers to a demagnetised exciter. There is a more direct explanation of the trouble, which can occur to any "shunt excited" d.c. generator which is directly connected to the winding of a magnetic circuit, the stored energy of which is large compared with that of the exciter field.



Possible circuit connections of alternator and exciter to cause demagnetisation

The sketches indicate what happens to the current flowing in the two magnetising windings when the exciter armature circuit is broken at or near a brush: (*a*) shows the normal flow and (*b*) shows the flow resulting from raising one brush (breaking circuit).

The explanation can be derived from Lenz's law, which can also be used to obtain the value of the voltage rise which occurs at the same time; although finally the machine has no voltage, the transient voltage may be dangerously high. The commutator may flash over. The cause may be foreign matter, for example, bits of mica getting beneath the brush of the exciter.—*T. J. F. Oldham.*

Earth Neutral Shorts

IF Mr Snelson (22 Sept.) would defer from the well-known practice of erecting his own target so that he might himself shoot at it and re-read my reference to d.p. switches he would see that I made no reference to the note of 22 Aug., but merely commented on a sentence or two in the contribution by "Ubique." It is not so difficult "to imagine circumstances leading to shock where the relevant regulations have been competently carried out" as Mr Snelson would have us believe. If, as "Ubique" had in mind, a single-phase installation having been competently carried out using s.p. switches throughout, the cable jointer or linesman carelessly crosses the neutral and line conductors, little imagination is required to realise the risk of shock which is then present. It is useless to blink our eyes to the fact that many opportunities arise for the crossing of neutral and phase conductors and this occurs over and over again, despite the best laid plans of the regulation makers. While s.p. switches are so widely used these mistakes or careless connections, whichever heading they come under, will result in someone eventually touching live equipment when it is supposed to have been made safe by opening a s.p. switch.—*R. A.*

Star/Delta Motor

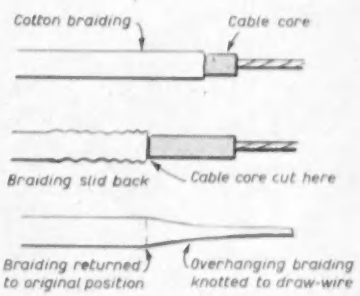
A LAUNDRY recently installed a water treatment plant with the sequence of operations controlled by a 4 h.p., 3-phase s.c. motorised valve. The motor was wound 400/440 V but the supply available was only 346 V. As there would be some delay in supplying a 346 V wound motor a local firm of rewinders undertook the rewind to 346 V.

After rewinding the motor was reinstalled but it was found that in certain positions of the valve the motor stalled. The manufacturers were contacted but their fitters were unable to find any defects in the valve mechanism. The rewinders gave their assurance that the motor had been rewound exactly as before except for a 346 V supply.

The motor appeared to lack power and after the usual tests was removed for further examination. On checking the internal connections it was noted that the windings were "star" connected, the leads were carefully broken-down and the windings "delta" connected. The motor was re-installed on the valve giving satisfactory results with no signs of stalling irrespective of the valve position.—*"Surveyor."*

Drawing-in Cable

WHEN the outer cotton braiding of a cable is loose, the usual method of fastening the draw wire to the conductor for pulling the cable into a conduit is not always satisfactory, as it often happens that the braiding starts to slide back, when in the conduit, and so causes a hold-up. I find a better way is to slip



Using cotton braiding when drawing in cables

the braiding back a few inches and cut off the exposed cable core. When the braiding is pulled back to its original position, the portion now overhanging the cable core can be knotted to the draw wire.—*G. W. Clegg.*

Protecting Cables

FROM time to time one reads in these notes cases of injury or faulty operation of portable tools due, originally to the cable supplying the tool having been damaged in some way or other. In certain cases the following expedient can be tried, whilst it is also suitable for protecting temporary cables subject to damage. The method is merely to house them in rubber air or water hose, the space between the cable and inner wall of the hose being filled with flake graphite.—*W.E.W.*

NEWS OF THE WEEK

Middle East has £250m to Spend

Training of Technicians in U.K. is Major Need

A MARKET where there is over £250 million sterling a year to be spent on development and improvement, and where restrictive controls are at a minimum is not one which the British electrical manufacturer can ignore with a clear conscience. Such a market exists in the Middle East where the seeds of extensive export trade were laid last year with the staging of the Baghdad Trade Fair. That all-British exhibition was very well received, and it remains only for those who took part, and others, to follow up the success. Both Iraq and Persia will have an estimated annual income of over £100m from the sale of oil, whilst Kuwait, Bahrain and other Persian Gulf states will be accumulating some £50m–£60m each year. Moreover, it is intended to spend this money. Following up last year's achievement at Baghdad, with on-the-spot representation by agents or British firms' own personal representatives, is, however, the biggest problem confronting Anglo-Middle East trade today. This was emphasised by H.M. Ambassadors in Baghdad, Sir Michael Wright, and Teheran, Sir Roger Stevens, and by H.M. Political Resident in the Persian Gulf, Sir Bernard Burrows, last week.

There are insufficient technicians and technical agents, and the complete answer has not been found. Sir Michael suggested that training of suitable persons in Britain might be the solution. Many firms were doing all they could under scholarship and other schemes, but could hardly cope with demand. He made a special appeal to U.K. firms to help, adding that the trainees' Governments would be prepared to pay all expenses if necessary as long as places could be found. Incidentally, Iraq probably offers the greatest opportunities for electrical exporters, if the demands of any one of these nations can be emphasised more than another.

Technical training in this country was Sir Michael's main appeal. Sir Roger Stevens, commenting on the same factor, said that a remedy tried with some success in Iran was that a technician from the selling firm had been attached to local agents. Sir Roger asked for greater interest to be shown in consumer goods with more personal visits and a greater interest in adapting themselves to local conditions. A similar plea was made by Sir Bernard Burrows who emphasised the tremendous potential for consumer goods when the market was developed. In addition he mentioned the importance of after-sales service (a point not ignored by his colleagues) and the need for more contractors to investigate the Persian Gulf States as a market.

Rules for Electrical Equipment in Ships

PREPARATION of a fourth edition of the Regulations for the Electrical Equipment of Ships has been authorised by the Council of the Institution of Electrical Engineers. This will supersede the existing third edition, published in 1939, as amended by the 1947 Supplement. The work involved is to be undertaken shortly by the appropriate committee, who will welcome comments or suggestions from interested bodies or persons. These should be addressed to the I.E.E. Secretary at Savoy Place, London, W.C.2, and should be received before the end of this year.

Fenners' Luton Branch

LAST Monday, J. H. Fenner and Co., Ltd., opened a new branch on a corner site in Guildford and Bute Sts, Luton, to keep pace with the town's industrial and commercial expansion which has necessitated mechanical power transmission equipment being immediately available for prompt delivery. Coincidental with the opening there was a special two-days' exhibition of the company's products. In charge of the new branch will be Mr E. C. Boddy, already well known in the district.

AROUND THE AREA BOARDS

Chairmen's Comments after Publication of Annual Reports

FOLLOWING the publication of their Annual Reports for 1954-55 last week, most of the Electricity Boards held Press conferences to explain facts and answer questions. A report of the Board's activities may be found on page 517 but the following are some of the comments and views of the Area Chairmen.

Domestic consumers in the **N. Western Electricity Board's** area were told that further increases in tariffs were not inevitable. The chairman, Sir Joseph Hallsworth, said the Board's policy was still to keep prices as low as possible, but another rise in the price of coal and more restrictions on their activities would make another increase extremely likely. Tariffs in the Area have been raised as from 30 Sept.

Sir Joseph said this year's budget included £600,000 for electrification in Lakeland. The C.P.R.E. had wondered why the Board quibbled at the suggestion of paying an extra £1,000 a mile to lay underground cable. The reason was that to cover 13 miles in Borrowdale would cost over £100,000 to supply about 100 consumers. If all Lakeland was served by underground cable the cost would be about £500 per consumer.

Consumers next door, in the **Merseyside and N. Wales Board's** area face a rise in charges shortly. Mr D. H. Kendon, chairman, commented in Liverpool, that a rise in tariffs was inevitable in the near future. But for the further increase in coal prices, the average price of a unit of electricity would have been reduced this year, said Mr Kendon. (As we go to press the Merseyside Board have announced increases in tariffs.)

Similar comment was made by Mr D. Bellamy, chairman of the **Yorkshire Board,** who said that but for coal prices the Board's tariffs could have remained at the same level. It was intended to continue the policy of fixing low tariffs and relying on increased sales and economic organisation to absorb costs.

A 10% reduction in capital expenditure, covering such items as new mains services, plant, land and buildings, was the objective of the **Midlands Electricity Board,** announced by Mr Walter Lewis, chairman. He said the Board had received official notice to cut expenditure and a report of savings, which would be possible, was being prepared for the C.E.A. Cuts would be difficult, he added, if they were not to impair the Board's efficiency, as the price of most materials was rising and it was not easy to forecast an accurate figure for the cost of work to be carried out.

And finally a word of advice to the electricity supply industry from Mr S. F. Steward, chairman of the **S. Western Electricity Board.** He said the industry must be prepared to be bold, to think ahead, and, above all, to keep up their determination to expand. It could not ease off in its commercial drive and there had to be a competitive spirit in the nationalised fuel industries—one must feel the need to compete in order to sell, he said.

AUSTRALIA CUTS IMPORTS BY £80 MILLIONS

AS FORECAST in these columns on 15 Sept. the Australian Government has once again cut her imports. The reduction in the amount of imports allowed into the Commonwealth totals some £A80m and the electrical industry will be affected to no small extent. The new restrictions are operative as from last Saturday (1 Oct.), and supplement those imposed last Apr. It was hoped to bring imports to a level which the Government could reasonably expect to finance by June 1956 without further running down their external reserves. Mr Robert Menzies, the Prime Minister, stated in Canberra that unless Australia was to have a permanently unbalanced economy with import restrictions as a chronic feature, something had to be done to stimulate exports. He hoped a sound basis would be found for an export credit scheme. Mr Menzies also said the hire-purchase industry had agreed to peg their turnover or outstanding agreements at the present level with an allowable increase not above 10% until 30 June, 1956.

Details of the cuts were announced later by the Minister of Customs, Senator N. O'Sullivan. Category A quotas have been reduced by 12½%. Electrical commodities included in this category are shavers, fans, filament lamps, and storage batteries. There are some exceptions, including aluminium wire, where the reduction is 7½%. Category B is probably the one which affects the industry, particularly consumer goods manufacturers most. Quotas in this Category have been cut by 25% and cover most electrical appliances; washing machines, cookers, radiators and kettles included. Allocation for goods in the administrative category have been reduced by 12½% overall, although cuts on individual commodities have yet to be decided. This includes all Government imports, train lighting and air-conditioning equipment, TV transmission and studio equipment, and components for TV receiving sets.

OFFICIAL PUBLICATIONS

OVERSEAS ECONOMIC SURVEY: Denmark. H.M.S.O. 4s.

N. OF SCOTLAND H.E. BOARD CONSTRUCTIONAL SCHEME No. 31, Tummel Valley Additions. Confirmation Order is S.I.1469, price 2d., and Explanatory Memo is price 4d. H.M.S.O. (see page 541).

EDUCATION AND TRAINING GRADUATE STAFF FOR IND. RESEARCH. Report on F.B.I.'s fourth conference at Ashorne Hill last Apr. Available from F.B.I., 4s.

RECOMMENDATIONS ON SAFETY IN CINEMAS, price 1s.; and HOME OFFICE CIRCULAR No. 150/1955 concerning Cinematograph Acts, 1909 and 1952, price 6d. Available from H.M.S.O. (see page 539.)

REFRIGERATION Command Paper 9578. Concerning International Inst. of Refrigeration. Agreement replacing International Convention of June 1920. H.M.S.O. 9d.

Smokeless London

THE Act designed to make the City of London a smokeless zone came into operation on Sunday. It is the City of London (Various Powers) Act, 1954, under which occupiers of premises will be liable to a penalty of up to £10 and to a daily penalty not exceeding £5, for emitting smoke. A great deal of improvement was expected immediately as City offices have for some time now been converting their heating arrangements, but 100% response is expected to take time. It is not possible to say at present exactly what steps have been taken to comply with the Act. It is hoped that the Act's ultimate effect will be to make atmospheric pollution in winter little different from the summertime position.

NEW RANGE OF U.S. CONTROL EQUIPMENT TO BE MADE IN ENGLAND

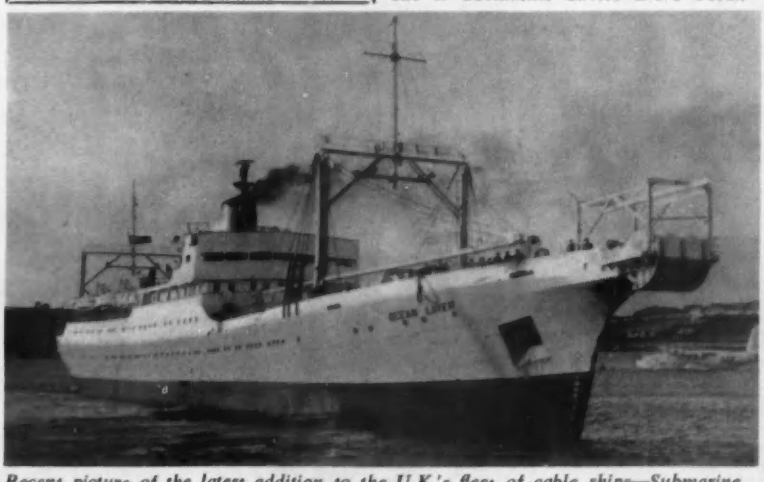
AMERICAN control equipment is to be made in this country by a subsidiary company which has just been formed. Mr F. W. Magin, president of the Square D Co. of Detroit, announced the establishment of their U.K. subsidiary last week. The new company will be known as Square D Ltd., and have its headquarters at 100 Aldersgate St, London, E.C.1. Branch offices will be established in important provincial centres and the British company will also serve selected export markets. Mr Magin stated that in the initial stages, selected motor control items from the U.S. range of electrical distribution and control equipment would be made for Square D by the Plessey Co., Ltd. Arrangements will be made to establish stocks of completed equipment and component and service parts. Ultimately a new range of electrical control equipment will be made here. Directors of Square D Ltd. are Messrs F. W. Magin, F. H. Roby and J. E. Magin, of the parent company, and Messrs B. C. Spicer and R. P. Chambers of Britain.

Cables for European TV

LAST month saw the opening of the first section of the permanent television link between Britain and the Continent. For controlling both incoming and outgoing programmes over the European link, the B.B.C. has established a new Control Centre. To provide a supply of power for operating the equipment, the B.B.C. have installed lengths of 0·0225 sq in. varnished cambric insulated cable made by W. T. Henley's Telegraph Works Co., Ltd.

"Ocean Layer" is Latest British Cableship

LATEST in Britain's expanding fleet of cableships was named at Pembroke Dock, London, last Thursday (29 Sept.). She is Submarine Cables Ltd.'s *Ocean Layer* built in 1948 as a dry cargo ship and converted by R. S. Hayes (Pembroke Dock) Ltd. She is our second largest cableship, being 378 ft in length and having a deadweight of 4,800 tons. She is also fitted with a Pleuger active rudder, a device comprising an auxiliary propeller housed in the rudder blade to increase manœuvrability, a useful feature in cable laying operations.



Recent picture of the latest addition to the U.K.'s fleet of cable ships—Submarine Cables' new "Ocean Layer,"—named last week

Ocean Layer has a service speed of 11 knots. Her full complement will comprise 81 officers and men and she will be commanded by Capt Joseph Marshall. She is able to carry upwards of 2,000 nautical miles of deep sea type cable, and capable of laying long cable incorporating underwater repeaters in one operation, as well as recovering and repairing existing cables at any depth. Her maiden voyage will be to the Skagerrak to lay the 67 nautical miles telephone cable between Norway and Denmark. Her work in the next 12 months has already been fixed and will take her into the Atlantic and Pacific Oceans. She sails for the Skagerrak this month and then to fulfil other contracts.

Monday is the Day to Plug Washing Machine and 'Fridge

MONDAY is the most suitable day to advertise a washing machine and a refrigerator, according to Hotpoint Electric Appliance Co., Ltd., who selected peak times on Monday nights for their entry into commercial television. Housewives are expected to be more attentive to "plugs" on that day, having just completed the weekly wash, and also having survived a day when all shops are closed and the problem of keeping food fresh is most apparent. The company has booked a series of one-minute weekly spots, in which, they state, the potential buyer is halfway to looking at actual appliances in their nearest shop or showroom.

Appeal to abolish P.T. on Space Heaters

THE National Chamber of Trade at their National Conference at Southend on Monday, adopted a resolution urging the Government to remove purchase tax from all space heating appliances. Mr L. J. Tarbit of Rotherham, moving the resolution said if the Government would give way on this point they would be promoting their Clean Air Bill. It would not mean a wasteful expenditure on the appliances by the public, industry or business interests, but that alternative systems to coal fires would be more readily available. It was reasonable that if the Government sought to bring about the Smokeless State they must also be prepared to remove the restriction of purchase tax and allow space heating equipment to be purchased tax free by occupiers, endeavouring to comply with the Government's requirements.

The Chamber's president, Mr J. O. Watkins of Swansea, commented that while the Government proposed to make a grant to domestic occupiers towards conversion of smokeless equipment all other occupiers would have to pay their own costs.

A corner of Manchester's new Lighting Service Bureau at 36 St. Ann St, including a display of lamps on the left and the demonstration shop window and showcase. The ceiling fittings can be hidden behind trapdoors in the far wall when not required.

Manchester has Her Own Lighting Service Bureau

A FURTHER important stage in the expanding provincial activities of the Electric Lamp Manufacturers' Assoc. took place last Thursday with the opening of a new Lighting Service Bureau in Manchester. The bureau has been represented in the area since 1951 by Mr Alfred Wilcock, but conveniently-situated demonstration rooms was the ambition to serve this important area. The premises are at 36 St. Ann St, and only a short way from all four main line railway stations.

The new bureau is small but is nevertheless equipped to show a wide variety of lighting fittings and techniques. Architects and industrialists are well catered for, but the shopkeeper will also find the demonstration shop window a valuable help. Among other demonstrations are those explaining the principles of lighting design, the influence of light on vision, brightness contrasts, and colour. There are also displays of lamps and fittings of many types. Another important use of the new premises will be the facilities for numerous lectures in the area.

Not without significance is the progress made by E.L.M.A. in their provincial activities since the war. The small office in Leeds was replaced in 1949 by a large fully-equipped Bureau with a demonstration theatre. In the Midlands a full-time engineer was appointed in 1947 and an office with demonstration rooms was opened in Birmingham in 1951. This was followed shortly afterwards by the appointment of an engineer and a Bureau in Newcastle.

LONDON LIGHTING COURSE

MONDAY, 31 Oct., will see the opening of London's 71st Illumination Design Course at the Lighting Service Bureau in Savoy Hill, W.C.2. This year's programme follows customary lines with a series of seven lectures to be delivered on successive Monday evenings. Titles of the talks, in order, are: Electric Lamps, Lighting Fittings, Lighting Design, Shop Lighting, Lighting for Industry, Lighting for Enjoyment, and Lighting in the National Economy. Applications for reservations should be made as soon as possible.

Television Plans cramp Business Radio

BUSINESS radio communication systems operating in the "high" band (170—190 Mc/s) will be threatened in the near future by plans to open two more channels in this band for further television programmes. The allocation of Band III (174—216 Mc/s) exclusively for television has been recognised for a number of years and commercial concerns including Area Electricity Boards utilising a section of this band were aware that the eventual extension of television programmes would necessitate a re-allocation of commercial channels. By entering the "low" commercial band (70—90 Mc/s), displaced high band mobile radio communications will be able to continue, but not without causing overcrowding in a band already ocupied by other commercial organisations, B.B.C. and the police.

To solve the frequency shortage problem, Pye Telecommunications have developed a new two-way radio which is claimed to be the first in the world to offer 25 Kc/s spacing. This means that the new equipment will operate on only a quarter of the frequency space required by existing equipment, thus making four times as many frequencies available. This new two-way radio employs crystal-controlled circuits which are said to ensure frequency stability to within ±0·0025% and capable of covering a range of 25—174 Mc/s with the use of appropriate crystals. In this country some 10,000 mobile radios are known to be in use and this figure is expected to increase considerably within the next few years. With this increase will come the frequency shortage problem existing today in the U.S.A., where over half a million radio telephones crowd the ether. Therefore it is not surprising to learn that Pye intend to enter the American, as well as the home market, with their new equipment which has already achieved some success in Canada.

Industrial Trucks

A SHORT time ago Yale electric and hand lift industrial trucks formed the basis of large-scale demonstrations held at the Southampton factory of A. C. Delco. Over 70 persons from industry, the nationalised undertakings and Government Departments attended, and over 30 organisations were represented. The show extended over two days and consisted solely of Yale equipment actually in use on various consumer's premises. The show proved to be an outstanding success and a number of big orders resulted.

Lighting Conferences for Architects being revived

BEFORE the war, E.L.M.A. organised an annual series of conferences for architects on electric lighting. This practice is being revived this year and starts on 20 Oct. The conferences are designed for practising architects and not for the electrical industry, but if the latter know of any architects who would be interested, E.L.M.A. will ensure that invitations are despatched. A number of well-known architects have co-operated with the Association in drawing up the programme.

The first lecture is to be given by Mr A. D. S. Atkinson on the Use and Abuse of Modern Electric Lamps. The second lecture will be on 27 Oct. when Mr J. M. Waldram will speak on Planning to achieve a Desired Lighting Effect. Finally, on 3 Nov. a lecture on the Appearance of Lighted Objects and Surfaces, will be given by Mr E. B. Sawyer. The meetings will begin at 6 p.m. at the Lighting Service Bureau in Savoy Hill, W.C.2, and will be followed by discussions. Plans are already being laid for subsequent conferences.

Highland's First Tariff Increase since 1952

THE first tariff increase since 1952 is to be made by the N. of Scotland Hydro-Electric Board as from 10 Oct. Mr T. Johnston, chairman, announcing this last Friday, said the average increase for domestic consumers would be about 11%. A similar increase is to be met in respect of street lighting, traction and industrial supplies and for battery charging. The present four-step tariff for residential and non-residential consumers is to be a three-step one, eliminating the winter rate of ½d. which applied in some areas. As regards farms and non-residential premises, if the present annual bill is about £50 the average increase is to be 2s. 1d. a week. For industrial consumers with a load factor of 20%, the increase will mean under 7d. per kW a week.

Installation in Cinemas

NEW regulations for safety precautions in cinemas come into operation on 1 Jan., 1956, and amongst subjects they touch on is the electrical installation. A Home Office circular sent to local authorities last week draws attention to the new regulations, and by way of interpretation, a memorandum "Recommendations on Safety in Cinemas" has been published by H.M.S.O.

In discussing the section of the Cinematograph (Safety) Regulations, S.I.1955 No. 1129, which applies to the electrical installation, the Memorandum recommends that the I.E.E. Wiring Regulations should be taken as the general standard. Amongst points to which attention is particularly directed is the inadvisability of labelling control switches situated in the auditorium. Discharge lamps receive special attention, and there is a recommendation that all firemen's switches controlling outside discharge lamps should be grouped together. The regulations provide for someone to be responsible for the electrical installation, but he need not be present all the time. It is made clear in the Memorandum that a responsible local electrical contractor may be appointed.

POWER SYSTEMS

AN Advanced Course on Power System Planning and Economics is being arranged by the Dept. of Electrical Engineering at Edinburgh's Heriot-Watt College. The lectures are to be given on six successive Saturday mornings beginning on 26 Oct. (9.30 a.m.). Fee for the course is £2. 2s. and applications should be addressed to the secretary of the College in Chambers St. There will be eight lecturers: D. J. Bolton formerly of the C.E.A., A. J. Cole, A. J. Howie and E. O. Taylor of the College, G. Lyon of Merz and McLellan, and C. R. Cooper, J. L. Egginton and J. T. Victor of the S. of Scotland Board. The syllabus begins with a talk on generation, followed by two on statistical methods and the use of computors. On the next two Saturdays there will be lectures on system planning. The sixth Saturday will be devoted to the economic choice and loading of plant, and finally the subjects of tariff design and metering.

WALSALL TROLLEYBUS RUNS IN PORTSMOUTH

A WALSALL trolleybus, showpiece of modern trolleybuses, is now in Portsmouth and Southsea. Through the joint efforts of the two municipal transport undertakings, the E.D.A. and B.E.A.M.A., the vehicle has been moved, and its its appearance in the southern town coincided appropriately with the recently held annual conference of the Municipal Passenger Transport Association. The trolleybus is easily recognised by its royal blue colour. It is one of the most modern design embodying the utmost luxury and having seating capacity for 70. It is 30 ft long, of lightweight composite construction and has a power consumption no greater than the familiar smaller vehicles seating 56.

Walsall's royal blue lightweight trolleybus, necessitating only two axles instead of the more conventional three, running through Portsmouth last week

First Transatlantic Telephone Cable completed Last Week

LAST week saw the completion of the first part of the new transatlantic telephone cable. Testing of the cable from its terminals near Oban and at Clarenville in Newfoundland, is now going ahead. It should be finally completed towards the end of next year, when the link will traverse some 2,000 nautical miles and have some 51 repeaters. Actual laying of the cable has been carried out by the cable ship *Monarch*, reloading twice at Erith, and with some assistance from the *Iris* which laid a short shore end out from Oban. During the greater part of the operation the weather was kind, but the difficult operation of buoying off the end of the second stretch of cable across the deepest part of the ocean, was completed on the Rockall Bank in a fierce gale. Newfoundland and the U.K. were eventually linked on 26 Sept., but not until the second cable is laid will two-way conversations be possible.

First Annual Lecture on Rural Electrification

FIRST George Johnstone Lecture to be delivered under the auspices of the S.W. Electricity Board, will be on Electricity and Efficient Farming. Author is Prof H. G. Sanders, chief scientific and agricultural adviser to the Ministry of Agriculture. It will be recalled that earlier this year, on the retirement of Mr George Johnstone, the Board decided to establish an annual lecture at the Seale-Hayne Agricultural College, Newton Abbot, as a satisfactory way of perpetuating Mr Johnstone's work in the field of rural electrification. The lecture is to be given at the College at 2.45 p.m. on 28 Oct.

Colourglaze Lamps for Battle of Flowers

INCREASING interest has been shown by local authorities towards the adoption of "Colourglaze" lamps, particularly in seaside resorts, Crompton Parkinson Ltd. report. Large-scale use was made of this type of lamp at this year's Battle of the Flowers in Jersey, with great success. Manufacturers claim that it is able to combat various extremes of weather.

Battery Campaign on TV

Good supplies of this tubular steel battery display stand are available from Crompton Parkinson Ltd. to all stockists during this year's advertising campaign. Other point-of-sale aids include a large showcard for mounting on the floor or in windows of garage showrooms; wall charts affording easy reference and advice; and a variety of literature. Filmlets on commercial TV will give an extra boost to the normal Press and poster advertising this year

Heat for Plymouth's Tenants

COUNCIL tenants in Plymouth are to enjoy additional facilities provided by the supply of electrical appliances following proposals submitted by the S. Western Electricity Board, and approved at Monday's council meeting. All new corporation houses are to be fitted with electric immersion heaters, and tenants will be charged a mere 2d. a week extra.

At the same meeting the Council agreed to instal some 1,900 1kW portable electric fires in the bedrooms of existing houses, and even more important perhaps, is the decision to instal 2 kW fixed panel electric fires in the sittingrooms of 320 houses. This programme will involve the replacement of some gas fires by electric appliances. Plymouth's decision comes at a very opportune moment in view of the extensive new housing projects to be undertaken in the near future. It is estimated that within a year about 1,000 immersion heaters will have been installed in new properties.

Manual Wage Claim

THE trade union side of the N.J.I.C. for the Electricity Supply Industry has been asked to consider proceeding with a claim for a substantial increase in wages for all manual workers in the industry. This followed an executive meeting of the National Union of Enginemen, Firemen, Mechanics and Electrical Workers last weekend.

Fine Weather and £3,400 create Two Records for Electrical Golf Championships

TWO records were broken at this year's Electrical Industries National Golf Championships, which took place last week at Sutton Coldfield. For the first time since the war the weather was fine, which provided the basis of an even more enjoyable meeting than hitherto. The Sutton Coldfield Golf Club was the scene of the championship itself, where the Sir Montague Hughman trophy was won by F. Warren, of Denis Ferranti Co., Ltd., with a net 62. Runner-up was F. W. Shaw, of the S.E. Board with 69 net. The J. Y. Fletcher cup for the best scratch score was won by Eric Walton, of Neptric Ltd., with 72. During the afternoon P. Richardson and H. Fletcher won the foursome competition and Sir Felix Pole's cups, and the Veterans' Trophy went to A. H. Taylor of the Midlands Board.

Nearby, on the Little Aston course, about 90 golfers competed for the Visitors' Trophy. Eventual winner was H. R. Ball with 65 net, whilst the best scratch score (79) was returned by R. Edwards of the English Electric Co. Some 140 players enjoyed good rounds on the two courses.

As usual, the annual dinner took place in the evening. Venue was the Grand Hotel in Birmingham and Sir Henry Self took the chair. Toast of the Golf Championship was proposed by Viscount Cobham, president of the M.C.C. Mr C. W. Kimbell, chairman of the local area committee presented the chairman with a cheque for £350, collected in the area for E.I.B.A. Sir Henry announced that the total sum expected to be collected in the 1955 golf championship would amount to a record of £3,400. Special thanks were extended to the organising secretary, Mr Frank Farthing, who supervised the whole competition. Other speeches were made by Mr W. S. Lewis, chairman of the Midlands Board, and Sir Harold Bishop, Association President.

The Writing of English

IN an amusing and lively talk, Sir Ernest A. Gowers gave the Batti-Wallahs and their guests the background of his two well-known books, "Plain Words," and the "A.B.C. of Plain Words." He emphasised that in his view good English was only, to a small extent, dependent on grammatical rules. The essence of communication was that it should be unambiguous, clearly understandable and that it should use the minimum amount of words in which to convey specific information. Plain writing was more than ever important in the large organisations of today where personal contact was small.

The members of the Society were particularly pleased to see Mr Mate—Mr T. C. Bigland—back again. He has now recovered from the serious injuries he sustained in a motor accident. Next luncheon will be on 26 Oct.

The First Half-Century

Now that the Electrical Exhibition at Olympia has been running for more than a week it is possible to form a general opinion of its probable effects. If the Executive Committee had at first any misgivings as to whether their hard work of the past six months would not bear generous fruit their doubts must have been entirely dispelled before the exhibition was forty-eight hours o'd. The place has been filled every afternoon and evening with large crowds. In many respects the exhibition is timely. For one thing, it is thirteen years since the industry had a big show to itself in London. For another, the season is right; the dark months are at hand, bringing the annual recrudescence of activity amongst those who supply artificial light and the requisites for its use. Further, trade generally is beginning to revive after long and severe depression, which has hit the electrical industry unusually hard owing to superadded complications peculiar to our own department of enterprise.—*From our issue of 5 Oct., 1905.*

Golf at Southend

ESSEX branch of E.I.B.A. held a golf meeting at Thorpe Hall Golf Club, Southend, recently. Main competition for the Metropolitan Cup and Replica was won by Mr W. A. Heythornwaite of the Eastern Electricity Board, with a score of 71, which is the course bogey. Runner-up was Mr T. C. Johnston of the Metropolitan Electric Cable and Construction Co. with 73, and Mr D. H. Robins was third with 74. A four-ball greensome competition against bogey in the afternoon, was won by Messrs K. J. Bunch and D. H. Robins, one up. Messrs L. A. Cane and C. E. Goldsmith finished second.

E.T.C.T.A. Midlands Golf

MIDLANDS branch challenge golf trophy competition of the Electrical Trades' Commercial Travellers' Association took place at the Moor Hall Golf Club recently. There was a good entry for the golf, and even greater numbers attended the presentation dinner in the evening. Prize winners were Messrs G. W. Arnold and H. R. Y. Ball, with the visitor's prize going to Mr L. Evans.

NEWS IN BRIEF

An increase of 4d. an hour as from 10 Oct., has been awarded to the 2,500 electricians in Eire, as a result of an agreement between the E.T.U., the Electrical Contractors' Association and the Society of Irish Electrical Traders.

Permanent medium-power television station at Meldrum, near Aberdeen, is to be opened on 12 Oct.

Next production of G.E.C. Dramatic Society, at the Fortune Theatre, London, next week, will be in aid of two charities,

the Electrical Trades Commercial Travellers' Association and the Royal Association in Aid of the Deaf and Dumb.

Next year's Building Plant Exhibition organised by the Ministry of Works will be at Newcastle-on-Tyne from 12 to 19 Sept.

New branch of E.A.W. has been formed at Altrincham. Chairman is Mrs H. Walsh and hon. secretary Miss M. Donaldson.

Junior Institution of Engineers have just announced the winners of eight awards for papers submitted and lectures delivered during 1954-55. The Premier Award was won by Mr R. J. Herbert.

General Electric Co. have received an order from the Donside Paper Co., Ltd., Aberdeen, for a 3,000 kV pass-out turbo-alternator set.

Contract for the provision of a new automatic telephone exchange in Valetta, Malta, has been awarded to Standard Telephones and Cables Ltd.

An invitation to graduate engineers and physicists to consider a career with the B.B.C. is contained in a booklet produced by the Corporation entitled "Engineers in the B.B.C." Every year the Corporation offer a number of 2-year graduate apprenticeships to engineers and physicists with Honours degrees and others.

This month's issue of *Ideal Home* includes a special heating and lighting supplement which is a feature on Lighting and the Eyes by Sam Black.

Industrial Welfare Society's Survey No. 22 is on the Development of Supervisors.

Official opening of Stanton Ironworks new coke ovens extension at Hallam Fields, Ilkeston, was performed by the Minister of Fuel and Power on 22 Sept.

Many of the Surrey cricket team, champion county for the fourth successive year, took part in a match between J. S. Clarke's XI (chairman and managing director of Sterling) and a Sterling Cable XI. The match was in aid of wicketkeeper Arthur McIntyre's benefit.

Sayings OF THE WEEK

"This Industry cannot ease off in its commercial drive, and there must be a competitive spirit in the nationalised fuel industries—you must feel the need to compete in order to sell. . . ." MR S. F. STEWARD, chairman, South Western Electricity Board.

"Smoke from domestic chimneys caused greater damage than that from most industrial furnaces because it was discharged at lower levels and contained a larger proportion of sticky tar. . . ." DR A. PARKER at the National Smoke Abatement Society's Conference.

"It seems out of the question that before the end of this century we could even provide half of our electricity by nuclear energy. . . . ." SIR FRANCIS SIMON, speaking at Clarendon Laboratory.

G

ELECTRIC SUPPLY NEWS

Clyde's Mill

Extensions to this power station in Cambuslang having been completed, the formal commissioning of the two new 30 MW turbo-alternator sets is to be carried out this month by Mr James Stuart, Secretary of State for Scotland. The station now has ten sets, with a total capacity of 277·5 MW, and 36 boilers.

Dolgarrog

Progress on the civil construction work for the C.E.A.'s Dolgarrog hydro-electric scheme is now well ahead of schedule, mainly thanks to the exceptionally dry summer, it is reported. The two tunnels are nearing completion and much of the aqueduct constructed. Mr H. H. Robinson, consultant engineer on the site, has forecast that the whole scheme will be completed in about twelve months' time. In this extension work two 5 MW Boving sets are being installed.

Drakelow

This new "A" power station is to be officially opened on 21 Oct. by Mr J. Eccles, deputy chairman, operation, of the C.E.A. The station has been in operation for some time now, two 60 MW sets and two 515 klb/hr boilers being in commission.

Merthyr

The final change-over of Merthyr's electricity supply from d.c. to a.c. was completed recently when the supply from the old Merthyr Electric Traction power station was switched off. The change-over has been completed greatly in advance of schedule, we understand.

North of Scotland

The North of Scotland Hydro-Electric Board's £1,340,000 scheme to extend the existing Tummel Valley project has been approved by the Secretary of State for Scotland. Under the new scheme two new power stations with a total capacity of 3,900 kW will be built. One of these will be erected on the eastern shore of Loch Ericht at the outlet of the existing tunnel from Loch Garry to Loch Ericht. This station will produce about 9 million units annually. The second power station will be built on the Allt Cuaich, a tributary of the River Truim near Dalwhinnie. This station will produce about 9,300,000 units annually. The scheme also includes the diversion of several burns to the Board's reservoirs, thereby adding a further 10 million units annually to the project. The existing aqueduct which leads water from the Dunalastair reservoir to the Tummel Bridge power station will be enlarged and the water level raised. This work will enable the kW capacity and the output of the Tummel Bridge power station, and of Clunie and Pitlochry power stations further down the Tummel Valley, to be increased.

Rotherham

Local householders and shopkeepers are stated to be drawing up a petition appealing to the Borough Council for action to control the dust and grit alleged to come from the local power station.

Stoke-on-Trent

Calling attention to the need for better maintenance of substation sites, Councillor H. Clowes, recently declared that in Stoke they were a disgrace to the Midlands Electricity Board. Speaking at a meeting of the Area Consultative Committee, he said that in Stoke, the layout of a 50-acre cemetery and crematorium was spoilt by the untended appearance of an M.E.B. substation occupying one-eighth of an acre at one corner. A resolution was passed recommending the Board to come to an agreement with local authorities for the maintenance of the sites.

Surrey

A proposal of the South Eastern Electricity Board to erect a l.t. overhead line along Hollow Lane, Wotton, to serve a number of cottages in the area, has been objected to by the Surrey Town and Country Planning Committee. In the opinion of the County Planning Officer, Mr L. V. S. Durrant, cottages in Hollow Lane were particularly pleasing and the view would be greatly harmed by the erection of the line on wooden poles, with the consequential feeder lines to each of the ten cottages. Mr Durrant's recommendation that this part of the line be placed underground and that the remainder be re-routed was supported by the Rural Council, the National Parks Commission and the Dorking and Leith Hill District Preservation Society. The Electricity Board are being notified of this recommendation.

LIGHTING SCHEMES

Chesterfield. It is proposed to borrow £1,536 for improved street lighting in various parts of the town.

Croydon. Plans are being prepared for the first stage of the Council's scheme to improve the main, secondary and side roads lighting over a period of about five years at a cost of £780,000.

Foulridge. The Parish Council has decided to convert street lighting from gas to electricity at a cost of £3,000.

Merthyr Tydfil. M.o.T. has approved sanction of loan of £5,237 for street lighting at Nelson.

Nottingham. M.o.T. has approved scheme for improved lighting on Western Boulevard from Radford Rd to Wollaton Rd.

Preston. R.D.C. has approved £25,000 scheme to convert street lighting in Penwortham to electricity.

Waterford. The T.C. has agreed to a scheme for improved street lighting.

COMPANY ACTIVITIES

LESS satisfactory are the results of H. J. Baldwin, the cable cover manufacturers. Trading profits are down by over 16% and because of the doubling of the Preference capital by a rights issue the 20% Ordinary dividend, which is maintained, was not fully earned. It would appear that it was a reshuffling of subsidiaries which affected the rate of profits. Re-tooling to permit increased turnover of precision and machine tools affected the profit of Cable Boxes while preparation for the sale of Hanbury Wharf Brick Co., which involved taking business elsewhere meant only a small profit from that company. The sale of this subsidiary has been profitably concluded subsequently. The Canadian subsidiary is still disappointing. It made a loss. For the future we must look for good results from a new acquisition, Railway and General Engineering, which was acquired with the assistance of the bank. Further economies are aimed at in a proposed merger of some of the engineering interests with those of this new acquisition, the profits of which amounted to £31,849 before tax in the last trading year.

The financial position is a little obscure owing to repayment of overdrafts out of last year's capital issue and then fresh borrowing in connection with Railway and General Engineering. But the outlook appears satisfactory, as stock has risen £102,000 to £186,807 while debtors are up from £168,000 to £232,000. Taken in conjunction with the chairman's announcement that it would not be necessary to provide new capital in the near future and that overdraft is to be reduced by the sale of surplus assets, it would appear that the financial position is improving.

Possibilities of progress in the electrical industry all the world over are almost unlimited, stated Sir Harry Railing (chairman) at the annual meeting of General Electric Co. Electric power forms the basis for increased raw material and food production and for progress in every industry, he added. "The world demand for our products, therefore, is hardly limited at this juncture." But he warned that the volume of G.E.C. production both for the home and export market depends ultimately on its ability to compete not only in quality but also in price.

Referring to the demand for an increase of 10% in wages, Sir Harry said that "agreement to such proposals would be the best way to price us out of the export markets.

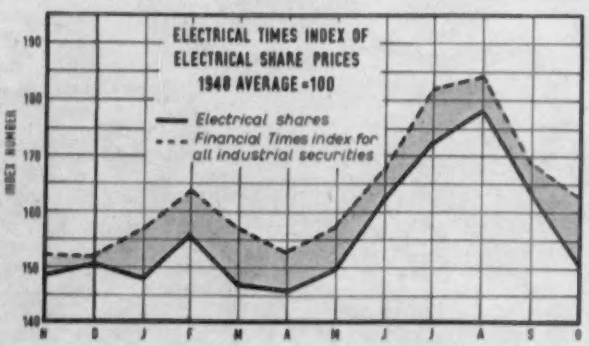
"The annual raising of new demands of this character contributes more than any other factor to handicap our export trade. They make it impossible to quote firm prices for long-term contracts. The damage is especially great in the electrical and capital goods industry on account of its high labour content."—*From our City Correspondent.*

Baghdad Light and Power Co.

Sale of current, plus other receipts for 1954, totalled £953,669, compared with £756,904 for the previous year. Generation and distribution costs increased to £215,957 (*£177,808*), and after allowing other charges the profit before taxation and depreciation is £649,576 (*£489,161*). Commitments for uncompleted orders for extensions to capital works amounted to £56,982 at 31 Dec. last, and further expenditure to complete such extensions is estimated at £485,953 (*£283,829*). These commitments have been taken over along with the undertaking by the Iraq Government this month, as we have already noted.

H. J. Baldwin and Co. Ltd.

Turnover was again maintained at a high level last year, but increasing costs reduced the profit margin, Mr H. J. D. L. Walmsley, the chairman, reports. Under a special arrangement with the Ministry of Fuel, the clay burning facilities at the Bunny Works are being improved, to reduce fuel costs. The falling off in demand for certain sizes of earthenware cable protection covers last year was anticipated, but the other electrical departments experienced an increased demand. It is expected that the group export turnover during the current year will constitute a highly satisfactory percentage of the aggregate sales. For the past year the Canadian subsidiary had a loss of approximately $2,900, but it is hoped that it will not be long before profit will be contributed to the group.



Both indices took another plunge during Sept. although industrial share prices in general did not suffer as much as the electrical prices in particular. "The Financial Times" index for all industrial share prices fell by 4·8 to 163·2, and the "Electrical Times" index dropped from 164·3 to 151·6

British Relay, Wireless and Television Ltd.

Provisional allotment letters were posted this week in the issue of 800,000 5s. "A" Ordinary shares and 500,000 6% £1 Cumulative Redeemable Preference shares. The "A" Ordinary were offered at 12s. 6d. each in the proportion of two-for-five. The Preference are being placed privately at 2s. each, subject to the passing of the necessary resolutions on 28 Oct.

Eire Electricity Supply Board

Lists opened on Monday for the issue at par of £10 millions of 5% stock 1966-75. Trustees of the Board's staff superannuation funds have applied for and been allotted £2 millions of the stock. The balance was underwritten by the Minister for Finance and the Irish Banks. The proceeds will be used to repay short term borrowings of £5,060,000 and for development work.

Electrical Components Ltd.

Provisional allotment letters were despatched earlier this week in the offer of 234,907 Ordinary shares of 5s. each, to which the chairman referred last August. The new shares were offered in the proportion of one-for-three, at a price of 13s. each.

Simon-Carves Ltd.

The offer of 850,000 5s. shares at 22s. each, to which we referred on 22 Sept., was over-subscribed eighteen times, it has been announced.

Southern Brazil Electric Co.

For 1954, the total income was £106,691 (*£164,186*), and after charging interest, foreign residents' tax, etc., the balance is £45,221 (*£104,045*). The company applied for exchange to pay interest accrued for period from July 1, 1951, to Dec. 31, 1954, on its 6% Prior Lien debenture and 6½% (reduced to 2½%) mortgage debentures, and these applications have just been accepted by exchange control authorities for remittance at rate of Cr.$122·696 to £1 in four monthly instalments.

Dividends Declared

British Aluminium Co., Ltd. Interim 4% (*same*).

T. Clarke and Co., Ltd. Interim 10% (9%) on increased capital.

Ericsson Telephones Ltd. Interim 4% tax free (*same*).

Expanded Metal Co. Interim 7½% (*same*) but on larger capital.

Superheater Co. Interim 10% (*same*). The board states that the volume of new orders in each department for this year is considerably in advance of that for the corresponding period last year.

Telephone and General Trust. Interim 3% (*same*).

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

7 Oct.—Ormskirk U.D.C. Concrete columns, lanterns, lamps, switchgear, etc., for Group A sodium street lighting.—Advertised in 15 Sept. issue.

7 Oct.—Staines U.D.C. Steel columns with lanterns, etc., for fluorescent and mercury lighting scheme along A.30.—See 29 Sept. issue.

8 Oct.—Ashford (Kent) U.D.C. Class A steel and concrete columns and mercury vapour discharge lamps.—See 29 Sept. issue.

8 Oct.—Belfast. Electrically-driven sewage pumps in No. 6 sewage pumping station.—See 15 Sept. issue.

8 Oct.—Walton and Weybridge U.D.C. Groups A and B units and conversion of 41 mercury vapour to sodium lamps.—Advertised in 15 Sept. issue.

10 Oct.—Biggleswade U.D.C. Concrete columns, lanterns, sodium discharge lamps and auxiliary equipment in re-lighting trunk road.—Advertised in 22 Sept. issue.

10 Oct.—Birmingham. Electrical installation at Norton Green sewage purification works.—See 1 Sept. issue.

10 Oct.—Co. Down. Installation in dwellings at Groomsport and Millisle.—See 29 Sept. issue.

10 Oct.—Stamford T.C. Group A and B lanterns and columns for various roads.—See 29 Sept. issue.

11 Oct.—N. Ireland. Electrical installation in 189 dwellings and shop at Braniel, Gilnahirk. N.I. Housing Trust, 12 Hope St, Belfast. Deposit 10s.

11 Oct.—Lancashire. Electrical installation at Huyton St. Dominic's R.C. school. Apply by above date, quoting ref: A/MG, to County Architect, P.O. Box 26, County Hall, Preston.

12 Oct.—Peterborough T.C. Concrete columns, electrical equipment, wiring, etc., for Group A lighting along A.15.—See 29 Sept. issue.

14 Oct.—Inverness. Electrical work in erection of Hall-Church at Hilton. Alex. Ross and Son, chartered architects, Queensgate Chambers.

15 Oct.—Ashington U.D.C. Electrical installations in ten blocks of (40) flats on Beamsley Terrace site. Engineer and Surveyor, Council Offices.

15 Oct.—Co. Galway. Electrical installation at girls' and infants' school at Tuam. E. R. Ryan, consulting engineer, 1 Montpelier Terr, Galway. Deposit £10. 10s.

15 Oct.—Kendal T.C. Mercury vapour lighting units for Group A street lighting in Lound and Burton Rds.—Advertised in 22 Sept. issue.

15 Oct.—Newcastle-on-Tyne T.C. Automatic telephone system for Transport and Electricity Undertaking.—Advertised in 22 Sept. issue.

15 Oct.—Ripley U.D.C. Installation of Class A sodium and fluorescent street lighting along Sheffield-Derby trunk road A.61. Surveyor, Town Hall. Deposit £2. 2s.

16 Oct.—Old Fletton U.D.C. Group A sodium discharge lamps and Group B mercury discharge fluorescent lamps with steel and cast iron columns, etc.—See 29 Sept. issue.

17 Oct.—Wallasey T.C. Installation at Lingham junior school.—Advertised in 22 Sept. issue.

18 Oct.—Alton U.D.C. Electrical wiring in 44 council houses. Engineer and Surveyor, Council Offices, High St.—Advertised in 29 Sept. issue.

18 Oct.—Enniskillen (N.I.) R.D.C. Electrically-powered, water pumping apparatus, etc., for Bellanaleck and Arney water supply scheme.—See 29 Sept. issue.

18 Oct.—N. Ireland. Automatic telephone exchange at Strabane.—See 22 Sept. issue.

18 Oct.—Maidstone T.C. Electrical installation in block of 12 flats on Shepway estate. Borough Surveyor, Palace Ave.

19 Oct.—Omagh (N.I.). Electrical installation at Gillygooley primary school. Chief Education Officer, Education Offices.

19 Oct.—South Antrim. Supply of electric lamps during 1956 to Lagan Valley and Lisburn Hospitals for S. Antrim Management Committee. Secretary, Dublin Rd, Lisburn.

20 Oct.—Rochdale T.C. Lighting and power installation at Townhead offices. Borough Surveyor, Town Hall.

21 Oct.—Co. Antrim. Electrical installation in Welfare centre at Ballyclare. J. McCandless, 6 Murray St, Belfast. Deposit £3. 3s.

22 Oct.—Co. Down. Electrical installation at Hillsborough (New) primary school. J. McCandless, consulting engineer, 6 Murray St, Belfast. Deposit £3. 3s.

22 Oct.—Dagenham T.C. Supply and erection of 36 Group A lighting units in Eastern Ave. Borough Engineer and Surveyor, Civic Centre.

22 Oct.—Durham. Supply of electrical equipment to Windlestone Hall residential school. G. H. Metcalfe, director of education, Shire Hall.

24 Oct.—Bowland (Lancs) R.D.C. Electrically-operated pumping plant.—See 29 Sept. issue.

24 Oct.—Middlesbrough. Supply, erection, etc., of additional 150 h.p. slip-ring motor and vertical centrifugal pump with switchgear, etc., at Fighting Cocks pumping station, for Tees Valley Water Board. T. S. R. Winter, Board's Engineer and General Manager, Corporation Rd. Deposit £5.

24 Oct.—Northampton T.C. Installation of about 1,100 Class B street lamps, comprising erection only of steel columns, and supply and erection of 150/100 W tungsten lanterns, etc. Borough Engineer, Guildhall. Deposit £2. 2s.—Advertised in this issue.

24 Oct.—Peterlee. Electrical installation in 136 houses on Dene House sites. A. V. Williams, general manager, Development Corpn., Shotton Hall, Castle Eden, Durham.

25 Oct.—Southampton T.C. Electrical rewiring and improvement at Portswood secondary junior and infants' school. Borough Architect, Civic Centre. Deposit £1.—Advertised in this issue.

26 Oct.—West Hartlepool T.C. Electrical and heating installation in first phase of Brierton county secondary school. Borough Architect, Municipal Buildings.

27 Oct.—Belfast T.C. Condensate chemical treatment plant for turbo-alternators.—Advertised in 15 Sept. issue.

27 Oct.—Newbury T.C. Lanterns, steel columns and control gear for trunk road lighting along A.4.—Advertised in 29 Sept. issue.

28 Oct.—Clay Cross U.D.C. Group A lighting units over ¼ mile of A.61.—Advertised in 29 Sept. issue.

29 Oct.—Milford Haven U.D.C. Supply and erection of 28 concrete columns with 140 W sodium lanterns, for Group A street lighting along A.4076 and removal of lanterns from transmission poles. Engineer and Surveyor, Town Hall. Deposit £2. 2s.

31 Oct.—Stranraer T.C. Installation in block of flats in Foundry Lane.—See 29 Sept. issue.

5 Nov.—Leeds T.C. Supply and erection of concrete columns, brackets, sodium lanterns, wiring for large Group A street

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 117 queries answered this week

"L.A.L." stocks and dies, makers of? W.E.—Lehman Archer and Lane Ltd., Hampshire Works, Forest Rd, Barkingside, Essex.

Aluminium jack chain, makers of? F.R.—A. J. Pratt and Sons Ltd., 7 Woodbridge St, E.C.1; H. Hipkiss and Co., Ltd., Goodman St Works, Birmingham 1; C. and S. B. Pumphrey Ltd., 214 Herbert Rd, Small Heath, Birmingham 10.

"Raydyot" lamps, makers of? W.E.L.—James Neale and Sons Ltd., 68 Graham St, Birmingham 1.

Infra-red roasting ovens with spits, suppliers of? P.C.—A. E. Warner (London) Ltd., 56 Brewer St, W.1; "V" (Development and Trading) Ltd., 22 Clifton Rd, W.9; Allen Walters and Co., Ltd., 6a St. John's Hill, S.W.11.

"Ferreko" compound, makers of? W.H.—British Paints Ltd., Britannic Works, Portland Rd, Newcastle-on-Tyne.

"Panelair" towel airer, makers of? D.C.—Panel Heaters, 77 Dean St, W.1.

ANSWER WANTED

"Refroster" refrigerators, makers of? B.B.

lighting schemes in Scott Hall and Harrogate Rds, and in Easterley Rd. Street Lighting Engineer, Springwell St. Deposit £2. 2s.—Advertised in this issue.

7 Nov.—Merthyr Tydfil. Pumping plant for Taf Fechan Water Board, comprising electrically-driven pumps with motors, starters, switchgear and instruments.—See 29 Sept. issue.

19 Nov.—Co. Galway. Pumping and filtration plant at Oughterard.—See 29 Sept. issue.

5 Dec.—Leeds T.C. Supply, erection, etc., of two electrically driven vertical borehole type centrifugal pumps with motors and switchgear for Headingley filtration works pumping station. General Manager and Engineer, Waterworks Dept., Civic Hall.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.*

24 Oct.—New Zealand. Supply of 5,000 40 amp M.C.R. 230 V 50 cycle, single-phase, 2-wire whole current credit type meters. Contract 615. Electricity Dept., Wellington City Corpn. B.o.T. (Ref.: ESB 20844/55).*

28 Oct.—South Africa. Durban Corporation's Electricity Dept. requires 2,420 yd of 0·25 sq in. cross section 33 kV H type cable L.A.S. 3-core with either shaped or circular conductors. Contract E.2622. Corporation is at Municipal Bldgs, West St. B.o.T. (Ref.: ESB 20568/55).*

28 Oct.—South Africa. Manufacture supply of 10 electrically-driven capstans for Table Bay Harbour, Cape Town. They should have high torque motors of squirrel cage type and arranged preferably for direct on line starting on a.c. 3-phase, 50 cycles, 380-400 V supply. Tender C.5245. Stores Dept., South African Railways, Johannesburg. B.o.T. (Ref.: ESB 20401/55).*

31 Oct.—Australia. Manufacture, supply, erection of electrically-driven pumping plant for Yas water supply scheme. Specif. No. 54-54/55 W.S. and S. Dept. of Public Works, Sydney, N.S.W. B.o.T. (Ref.: ESB 19964/55).*

31 Oct.—India. Supply of 85 33 kV and 125 11 kV rotating-type outdoor gang-operated station-type air-break switches, for Electricity Dept., Government of Andhra. Specif. No. A.204. B.o.T. (Ref.: ESB 20682/55).*

7 Nov.—New Zealand. Supply of total of 1,014 ammeters, moving-coil type d.c. single range, suitable for ¼ in. to 3/16 in. ferrous panel. Contract P and T 150/8233. Director General, Stores Div., G.P.O., Wellington. B.o.T. (Ref.: ESB 20255/55).*

7 Nov.—Portuguese East Africa. Tenders (A/CFB/1/1-75/55) invited for two electrical induction furnaces and complete wheel-and-axle handling plant for each, suitable for a.c. 3-phase, 50 c/s, 380 V supply. Ports, Railways and Transport Dept., Lourenco Marques. B.o.T. (Ref.: ESB 19980/55).*

15 Nov.—Australia. Forty-one items of multi-channel cable carrier telephone equipment required by Commonwealth Posts and Telegraphs Dept. Schedule C.7385. Documents available from Australia Hse, Strand, London, W.C.2.

21 Nov.—Portuguese East Africa. Supply of complete diesel engine-generator set of 100 kW capacity with control and distribution switchboards and accessories for new electrical power plants at Moamba. Tender 236/55. Ports, Railways and Transport Dept., Lourenco Marques. B.o.T. (Ref.: ESB 20003/55).*

25 Nov.—India. Manufacture, erection, etc., of two 15,000 kW turbo-alternator sets, two boilers of 200,000 lb/hr capacity, with ancillary equipment and coal and ash handling plant for second extension of Utran power house. Specif. T.14/15. Documents from Stores Purchase Officer, Bombay Electricity Board at Rs. 100 a copy.

1 Dec.—India. Manufacture, erection, etc., of one 30,000 kW M.C.R. steam turbine generator, condenser, feed heating plant, etc., for Khaperkheda power station plant extension. Specif. No. Project/5. B. V. Deshmukh, Project Officer, Madhya Pradesh Elect. Board, New Castle Building, Seminary Hills, Nagpur. B.o.T. (Ref.: ESB 20333/55).*

1 Dec.—India. Supply of equipment for extension to outdoor switchgear in Machkund hydro-electric scheme: six 132 kV bays D.D.B. type; six 132 kV disconnectors; three 11 kV structures for Delta connection; three 132 kV O.C.B. or A.C.B.s; earthing and fire protection equipment. Specif. No. A.203. Elect. Dept. of Government of Audhra, 20 Rutland Gate, Madras 6. B.o.T. (Ref.: ESB 20341/55).*

2 Dec.—Nicaragua. National Light and Power Co. of Managua require about 110 miles of transmission lines of 69 kW; 57 miles of lines of 13·2 kW; six receiving substations and electrical distribution systems for 15 towns. Enquiries should be addressed to Kuljian Corporation, 1200 North Broad St, Philadelphia 21, Pennsylvania, U.S. B.o.T. (Ref.: ESB 20346/55).*

14 Jan., 1956—Iraq. Supply, erection, etc., of equipment including two electrically-operated high lift and two electrical low lift pumping units for Malha water supply scheme. Director General of Municipalities, Baghdad. B.o.T. (Ref.: ESB 19879/55).*

21 Jan., 1956—Iraq. Supply, erection, etc., of various equipment including electrically-operated low and high lift pumping units for Balad Ruz water supply scheme. Documents from Royal Iraqi Embassy or Legation at £5 a copy. Directorate General of Municipalities, Baghdad. B.o.T. (Ref.: ESB 19880/55).*

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 4 October

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	365	−8	310
,, (3 months)	358	−13	284½
R.S.T. (Rhodesian Selection Trust) group price*	360	—	—
LEAD, refined pig, min. 99·97% purity (cash)	106½	+15	110½
,, (3 months)	106½	+15	106
TIN, refined, min. 99·75% purity (settlement)	749	+1	736½
,, (3 months)	747	−2	736½
ALUMINIUM, ingots 99·99-5%	171	—	150
ZINC, virgin, min. 98% purity (cash)	91½	−17½	83½
,, (3 months)	91	−17	83½
RUBBER No. 1, RSS. spot (per lb.)	38½d.	−3½d.	22d.
,, c.i.f. basis, ports. Nov. (per lb.)	37½d.	−3½d.	21½d.
ARMOURING :			
Galv. Steel Wire (0·104 in.)	56½	—	52½
Mild Steel Tape (0·04 in.)	43½	—	40½

(*Fixed price c.i.f. U.K., now subject to change at 24 hours' notice, to "consumers willing to instil a degree of stability into the resale price.")

Gazette Announcements

COMPANIES ACTS

Henray Electrical Co., Ltd. First and final dividends of 13/16d. in £, payable on 17 Oct. at 100 Park St, London, W.1.

Ward's Electrical Services (Westergate) Ltd. Meeting of creditors will be held at 8-9 Arcade Chambers, Bognor Regis, on 12 Oct. at 3 p.m. The notice is purely formal as declaration of solvency has been registered and all creditors will be paid in full.

Robbins and Bradley Ltd. Meeting of members will be held at 1 Woodfield Ave, Penn, Wolverhampton, on 19 Oct. at 11 a.m., to receive liquidator's report.

Wonder Washing Machine Co., Ltd. Resolution for voluntary winding-up passed at meeting on 16 Sept. O. G. Sunderland, C.A., 15 Eastcheap, London, E.C.3, has been appointed liquidator.

F. Clough and Co. (Electric Washing Machines) Ltd. Creditors are asked to send particulars to liquidator, J.Colman of 1 Dalton Sq, Lancaster, by 29 Oct.

Collier Electric (Switches) Ltd. Creditors are asked to send particulars by 21 Oct. to A. C. Blake, 199 Piccadilly, London, W.1, the liquidator.

BANKRUPTCY ACTS

First Meeting

Wandsworth. William E. Crees, electrical engineer of 171 Lavender Hill, Battersea. First meeting will be at 58-61 York Terr., Regent's Park, N.W.1, on 12 Oct. at 11.30 a.m., and public exam. at The Court Hse, Garratt Lane, Wandsworth, S.W.18, on 9 Dec., at 10.30 a.m.

Receiving Order

Reading. M. S. Harris, electrical engineer, of Four Winds, Beech Rd, Purley. Date of receiving order, 20 Sept.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Wira. 729,637. Class 9. Electrical, scientific, weighing, measuring apparatus and instruments, etc. Wool Industries Research Association, Torridon, Headingley, Leeds 6.

Auto-Sparks Ltd., Hull, in design. 732,259. Class 9. Sets of wiring systems and cables for motor land vehicles, etc. Auto-Sparks Ltd., 61a Lime St, Hull.

R. in design. 743,388. Class 9. Instruments, apparatus, systems for production, transmission, etc., of signals, etc. Central Rediffusion Services Ltd., Carlton Hse, Lower Regent St, S.W.1.

BUSINESS PROSPECTS

Bacup T.C. Erection of 24 houses on Tunstead Rd estate. Borough Engineer, Municipal Offices.

Bangor (Caer). Amended plans for extensions to General Hospital being prepared by Saxon, Smith and Partners, architects, 2 Stanley St, Chester. Extensions comprise two new ward blocks, out-patients' dept. and X-ray dept., and will cost about £300,000.

Barnes T.C. Construction of block of 16 flats and other buildings in Lonsdale Rd scheme. Borough Engineer and Surveyor, Municipal Offices, Sheen Lane, S.W.14.

Barnsley T.C. Erection of maternity and child welfare school and health clinic in Littleworth Lane, Lundwood. Borough Engineer, Town Hall.

Bedale (Yorks) R.D.C. Construction of 22 houses. Architects are Harley Richardson and Shaw, 3 Skinnergate, Darlington.

Birkenhead T.C. Erection of 70 houses, 24 flats, 9 shops and 9 maisonnettes on Overchurch estate. Borough Architect, 3 Conway St. Also, application to be made to borrow £157,365 for erection of Woodchurch secondary school for boys.

Birmingham. B.o.T. approved erection of new office buildings and extra canteen space in Bournville Lane for Cadbury Bros. Ltd.

Blackpool. Plans approved for erection of Bispham county secondary school in All Hallows Rd. Cost estimated at £168,000.

Breconshire. Construction of new fire station in Brecon Rd, Hay-on-Wye. C. M. S. Wells, clerk of Joint Fire Brigade Committee, County Hall, Brecon.

Bridlington (Yorks) T.C. Plans in hand for erection of 60 houses on West Hill estate.

Bridport (Dorset) T.C. Plans in hand for additions to Municipal offices.

Brighouse (Yorks). Berry's Foundry (1949) Ltd., Brownroyd Hill Foundry, Low Moor, are planning new premises on Wakefield Rd industrial estate.

Bristol. Plans approved for 7-storey building, Shell-B.P. Hse, in Wine St, for City Centre Properties Ltd. Architects are J. Cotton, Ballard and Blow, Cavendish Hse, Waterloo St, Birmingham. Also, it is proposed to erect block of 5 shops with 3 storeys above in Old King St.

Burton-on-Trent T.C. Erection of 71 dwellings and 13 garages in Ashby Rd. Borough Architect, Town Hall.

Co. Down. C. Lord of Belfast are planning new textile factory at Donaghadee. A. G. Crawford, 1 Leonard St, Belfast, is quantity surveyor.

Cardiff T.C. Erection of total of 176 dwellings under five contracts at Llanrumney. City Surveyor's Office, City Hall.

Cardiganshire. Extensions to grammar school estimated to cost £68,000, and new infants' school at Penparean, £32,186.

Cheltenham. Plans submitted by Martin Cadbury (Printers) Ltd., 4 St. Luke's Rd, for factory in Bouncers Lane.

Clutton (Som) R.D.C. Approval sought for erection of 141 houses next year.

Cowbridge (Glam) R.D.C. Erection of ten blocks of houses on four sites. W. R. Hawkins, Surveyor and Engineer, 41 Eastgate St.

Deptford T.C. Construction of block of 14 maisonnettes in Wickham Rd, and 15 flats in Lausanne Rd. E. Field, town clerk, Town Hall, New Cross Rd, S.E.14.

Donegal. Erection of 39 dwellings on various sites. County Secretary, Lifford.

Dublin. Tenders to be invited for erection of 138 houses at Coolock, and, at a later date of 48 flats in Hogan Place.

Eccles. Planning permission granted for office buildings and canteen in Silk St, for Shell-Mex and B.P. Ltd., Oxford Rd, Manchester.

Edinburgh. Royal Infirmary considering plans for reconstruction of Convalescent Hse, Corstophine, for use as auxiliary hospital.

Elgin. Extension to Elgin Academy is estimated to cost £65,000.

Forfarshire. Plans approved for extensions to Douglasfield Works of Jute Industries Ltd., Dundee. Architects are Sir Alexander Gibb and Partners, 43 Northumberland St, Westend, Edinburgh.

Glasgow. Twisteel Reinforcement Ltd., 43 Upper Grosvenor St, London, W.1, to erect factory and offices in Pinkston Rd.

Harrow. New grammar school for boys to be built at Hatch End.

Hartlepool. Additions costing some £2m are planned at works of Steetley Magnesite Co., Ltd.

Kingswood (Sur). Legal and General Assurance Soc. Ltd., 188 Fleet St, E.C.4, proposing to erect office block at St. Monica's. Architect is R. Fielding, Aldwych Hse, W.C.2.

Liverpool. Tenders may soon be invited for erection of new municipal bath at North Parade, Speke, at estimated cost of £150,000.

Llangollen. Factory adjoining Berwyn works to be built for Caldecot Press Ltd., at cost of about £25,000.

Mickleover (Derby). Nestle Ltd., Hayes, Middlx., propose to erect factory in Station Rd.

Middlesbrough T.C. Sketch plans approved for £50,000 additions to Dorman Museum. Plans to be submitted to Ministry.

Newchapel (Sur). First Mormon Temple in Britain to be built in district. Architect is Edward O. Anderson, Salt Lake City, Utah, U.S., and supervising architect is Sir Thomas Bennett, of T. P. Bennett and Partners.

North Riding. Work hoped to start in New Year on proposed Bedale county modern school.

Northants. R.C. secondary modern school costing £91,960 and extensions to Spencer girls' and boys' secondary modern school to cost £85,000 included in 1956-57 programmes.

Northumberland. School plans for inclusion in 1956-57 building programme approved by Ministry. Twelve schools are named including Wallsend county technical (£223,800); Newburn county secondary (£148,104); Castle Ward county secondary (£108,785); Castle Ward county primary (three costing total of £252,775); completion of S.E. Northumberland county grammar (£118,483); part of Gosforth county secondary (£106,145); and Ashington county grammar (£100,000).

Penzance T.C. Approval sought for erection of 18 flats at St. Peter's Hill, Newlyn, and 21 flats and 11 houses on Princess Royal estate.

Port Talbot T.C. Erection of 100 houses on Dog site, Sandfields. G. V. Griffiths, Borough Engineer, Municipal Buildings.

Preston T.C. Erection of 103 houses and 12 flats on Savick estate. Borough Engineer and Surveyor, Municipal Building.

Richmond (Yorks). Davis, Belfield and Everest, 9 Ashley Place, London, S.W.1, are quantity surveyors for proposed £200,000 county modern school.

Romford T.C. It is proposed to erect seven blocks of flats at Oldchurch Park. Planning permission granted for erection of 100 houses and 28 flats in Lodge Lane, West Side.

St. Marylebone. Work hoped to start in April on Jews College in Montagu Sq. Architect is E. Rosenberg of Yorke, Rosenberg and Mandell, 2 Hyde Park Place, Marble Arch, W.2.

Scarborough. Scarborough Holiday Chalets Ltd., Scholes Park Rd, are seeking permission to convert their Scalby Mills Holiday Camp into a self-contained conference centre. Cost estimated at £250,000.

Sheffield T.C. Construction of 125 dwellings on Gleadless estate and 8 on Arbourthorne estate. J. L. Wormsley, City Architect, Town Hall.

Smethwick T.C. Construction of 158 houses on Kingsway West estate, Oldbury. Engineer and Surveyor, Council Hse.

Stamford (Lincs). Third storey to be added to nurses' home at Stamford and Rutland Hospital. F. J. Lenton and Partners, 16 Broad St, are architects.

Stirling. Dean of Guild Court approved erection of 222 houses in Broomridge housing scheme; also of 26 houses for Scottish Special Housing Assoc.

Stockton-on-Tees T.C. Construction of 42 houses on Albany estate. Borough Architect, T. C. Hartley, 28 The Square.

Swansea T.C. Erection of 24 flats in Port Tennant Rd. Borough Architect, The Guildhall.

Tynemouth T.C. Erection of 40 dwellings in Langley Rd. Borough Surveyor, 16 Northumberland Sq, North Shields.

Welwyn Garden City. Ardath Tobacco Co., Ltd., Broadwater Rd, propose factory extensions costing £500,000. Architects are Louis de Soissons, Peacock, Hodges and Robertson, Midland Bank Chambers, Howards Gate.

West Bromwich. Factory to be built at Goldshill by Midland Motor Cylinder Co., Ltd., Dartmouth Rd, Smethwick.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

Trade Installations, Ltd., 10 Parliament St, Gloucester. Designers, manufacturers, installers and repairers of, and dealers in, electrical, radio, sound recording, radio and television relay services, etc. Nom. cap.: £10,000. Dirs.: L. W. Huggins and J. G. Sterry.

K. Howe and Son Ltd., 583 Selby Rd, Leeds, 15. Manufacturers of and dealers in electronic apparatus, wireless and television sets, etc. Nom. cap.: £1,000. Dirs.: A. E. Howe and K. Howe.

Bull and Lott Ltd., 51 Crawford St, W.1. Electrical engineers and contractors, etc. Nom. cap.: £100. Dirs.: J. D. Bull and P. W. Lott.

Birmingham Induction Heat Ltd., 4 Frederick Rd, Edgbaston, Birmingham, 15. Specialists in induction and selective heating, etc. Nom. cap.: £1,000. Dirs.: H. P. Allsop, H. G. Leach and F. Key.

Robins (Telephones) Ltd., 127/128 The Arches, Macfarlane Rd, Wood Lane, W.12. Manufacturers of and dealers in inter-communication, telephone, telegraph and radio apparatus, etc. Nom. cap.: £500. Dirs.: G. G. Robins and Mrs E. P. Robins.

MEETINGS TO NOTE

THURSDAY, 6 OCT.

I.E.S. (Cardiff). "Lighting for Sport." M. W. Peirce. Elect. Offices, The Hayes, 5.45 p.m.

I.E.S. (Glasgow). "Architects and the New I.E.S. Code." A. Buchanan Campbell. 39 Elmbank Cres, 6.30 p.m.

I.E.S. (Leeds). Supper dance at Astoria Ballroom.

I.E.S. (Nottingham). Chairman's address by P. A. Moore. Elect. Offices, Smithy Row, 6 p.m.

INCORP. PLANT ENGINEERS (Merseyside and N. Wales). "Statutory Requirements in Connection with Boilers and Pressure Vessels." G. A. Anderson. Royal Instn., Colquitt St, Liverpool, 7.15 p.m.

INCORP. PLANT ENGINEERS (Peterborough). "Gas Turbines in Industry." J. R. Needham. Campbell Hotel, Bridge St, 7.30 p.m.

BRITISH INSTN. OF RADIO ENGRS. (N. Western). "Colour Television." G. N. Patchett. Followed by annual meeting. College of Technology, Sackville St, Manchester, 6.30 p.m.

I.E.E. (London). Inaugural address as President: Sir George Nelson. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N. Scotland). Chairman's address by J. Knox. Queen's College, Dundee, 7 p.m.

CHELMSFORD ENGINEERING SOC. Presidential address by B. N. Maclarty. Hoffmann's Social Hall, 7.30 p.m.

A.S.E.E. (S. London). Supply Engineers' Visit to Italy. A. Tonge. Half Moon Hotel, Broad Green, Croydon, 8 p.m.

E.P.E.A. (Manchester). "H.V. HRC Fuses." Dr K. Dannenberg. Elect. Offices, Town Hall Extension, 7 p.m.

FRIDAY, 7 OCT.

ELECT. TRADES COMMERCIAL TRAVELLERS' ASSOC. Annual Ball at Park Lane Hotel, Piccadilly, W.1, 7 p.m.

I.E.E. (N. Scotland). Inaugural Dinner. Chairman's address by J. Knox. Caledonian Hotel, Aberdeen, 6 p.m.

I.E.E. (N. Staffs). Chairman's address by E. R. Patrick. Elect. Showrooms, Stoke, 7 p.m.

I.E.E. (Southern). "High Speed Photography." W. D. Chesterman. S. Dorset Technical College, Weymouth, 6.30 p.m.

A.S.E.E. (Liverpool). "Electric Fire Alarm System." Div. Offr. C. R. Mansell. Liverpool Engineering Soc., 9 The Temple, 24 Dale St, 7.30 p.m.

MONDAY, 10 OCT.

I.E.S. (Sheffield). Chairman's address by W. Berry. The University, Western Bank, 6.30 p.m.

I.E.E. (N. Eastern). Chairman's address. Neville Hall, Newcastle, 6.15 p.m.

I.E.E. (S. Midland Supply and Utilisation). "Installation of Metal-Sheathed Cables on Spaced Supports." W. Holttum. Regent Hse, Birmingham, 6.30 p.m.

I.E.E. (Western). Chairman's address by T. G. Dash. S. Wales Inst. of Engineers, Park Place, Cardiff, 6 p.m.

I.E.E. (London Students). Chairman's address: "A.C. Switchgear." M. H. F. Collins. Savoy Place, W.C.2, 6.30 p.m.

LEICESTER ELECTRICAL SOC. "High Quality Sound Reproduction." A. R. Hawes. Elect. Offices, Charles St, 7 p.m.

A.S.E.E. (London). "Cinema Sound and Projection Equipment." A. H. Richardson. St. Ermin's Hotel, Caxton St, S.W.1, 7 p.m.

A.S.E.E. (N.W. London). "Magnetic Amplifiers." F. E. Spooner, Century Hotel, Forty Ave, Wembley Park, 8.15 p.m.

TUESDAY, 11 OCT.

I.E.S. (London). Presidential address by A. G. Higgins. Royal Instn., Albemarle St, W.1, 6 p.m.

INCORP. PLANT ENGINEERS (Manchester). "Steam for Process." L. G. Northcroft. Engineers' Club, Albert Sq, 7.15 p.m.

I.E.E. (London Measurement and Control). Chairman's address by W. Bamford. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (E. Midland). Chairman's address by F. R. C. Roberts. Annual meeting. Loughborough College, 7 p.m.

I.E.E. (Cambridge Radio). Chairman's address by Brig. E. J. H. Moppett. Cambridgeshire Technical College, Collier Rd, 6 p.m.

I.E.E. (N.W. Utilisation). "Installation of Metal-Sheathed Cables on Spaced Supports." W. Holttum. Engineers' Club, Albert Sq, Manchester, 6.15 p.m.

I.E.E. (N. Ireland). Chairman's address: "Problems and Progress in Electricity Distribution." Maj. E. N. Cunliffe. Queens Univ., Belfast, 6.30 p.m.

I.E.E. (Rugby). Chairman's address: "Development and Research in Electrical Machine Design." L. D. Anscombe. College of Technology and Arts, 6.30 p.m.

WEDNESDAY, 12 OCT.

INCORP. PLANT ENGINEERS (E. Midlands). "Planned Maintenance." A. S. Stedman. County Hotel, Theatre Sq, Nottingham, 7 p.m.

BRITISH INSTN. OF RADIO ENGRS. (W. Midlands). "Frequency Modulation Broadcasting and Reception." H. E. Farrow. Tech. College, Wulfruna St, Wolverhampton, 7.15 p.m.

I.E.E. (E. Anglia). Chairman's address by E. T. Norris. Assembly Hse, Norwich, 7.30 p.m.

I.E.E. (N.W. Radio). "Diffused Impurity Germanium Junction Photo-Electric Cell," J. M. Waddell, S. E. Mayer and S. Kaye; "Transistor d.c. Converters," L. H. Light and P. M. Hooker; "Transistor Power Amplifiers," D. D. Jones and R. A. Hilbourne. Engineers' Club, Albert Sq, Manchester, 6.45 p.m.

I.E.E. (N. Scotland). "Electrical Energy from Wind." E. W. Golding. Caledonian Hotel, Aberdeen, 7.30 p.m.

I.E.E. (Southern). James Clayton Lecture: "Nuclear Reactors and Power Production," Sir Christopher Hinton. R.A.E. Technical College, Farnborough, 7.30 p.m.

I.E.E. (S. Western). "Domestic Heat Pump." G. O. McLean. Cornwall Technical College, Trevenson, Camborne, 7 p.m.

I.E.E. (Oxford). "New High Quality F.M. Broadcasting Network." H. Page. Elect. Offices, 37 George St, 7 p.m.

I.E.E. (N. Lancs). Chairman's address by W. Ward. Elect. Offices, 19 Friargate, Preston, 7.15 p.m.

A.S.E.E. (Birmingham). Lecture by member of Interplanatory Soc. Chamber of Commerce, New St, 7.15 p.m.

A.S.E.E. (Halifax). Inaugural meeting. Address by gen. secretary and Electrical Engineers' Exhibition Film. Crown Hotel, Horton St, 7.30 p.m.

A.S.E.E. (S.W. (London). Branch lecturettes competition: "Underfloor Ducting Distribution," J. T. Martin; and "Light and the Eye," C. F. Oliver, Guild Hse, Worple Rd, Wimbledon, 8.15 p.m.

A.S.E.E. (York). "Power Factor Improvement." R. G. N. Soper. Shambles Cafe, 7.15 p.m.

THURSDAY, 13 OCT.

INCORP. PLANT ENGINEERS (Glasgow). "Hermetically sealed Refrigerating Equipment." A. K. Alcock. Building Centre, 425 Sauchiehall St, 7 p.m.

I.E.E. (London Utilisation). Chairman's address by D. B. Hogg. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N. Scotland). "Electrical Energy from Wind." E. W. Golding. Queen's College, Dundee, 7 p.m.

I.E.E. (Swansea). Chairman's address by J. H. Groocock. Elect. Offices, The Kingsway, 6 p.m.

FRIDAY, 14 OCT.

INST. OF FUEL (Scottish). "Development of Slurry Handling Plant at Barony Power Station." J. R. Croucher. Royal Technical College, Glasgow, 7 p.m.

E.P.E.A. (Southern Meter Engrs.). "Some Impressions of America." L. H. Welch. Caxton Hall, S.W.1, 6.30 p.m.

A.S.E.E. (Stoke). "Metal Rectifiers." N. Stafford Hotel, 8 p.m.

A.S.E.E. (Bristol). Meeting at York Hse Hotel, Bath, 7.30 p.m.

MONDAY, 17 OCT.

BIRMINGHAM ELECTRIC CLUB. "The Proton Synchrotron." J. L. Symonds.

IPSWICH ELECTRICAL ASSOC. "Factory Lay-out and Mechanical Handling." L. Landon Goodman. Electric Hse, 7.15 p.m.

I.E.E. (London). Discussion on "Railway Signalling." J. H. Fraser. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Mersey and N. Wales). "High-Speed Electronic-Analogue Computing Techniques." D. M. MacKay. Liverpool Royal Instn., Colquitt St, 6.30 p.m.

I.E.E. (N.E. Radio and Measurements). Chairman's address by C. H. W. Lackey. King's College, Newcastle, 6.15 p.m.

I.E.E. (Western Supply). Chairman's address by E. K. Wood. S. Wales Inst. of Engineers, Park Place, Cardiff, 6 p.m.

I.E.E. (Reading). "Electrical Industry—Career Opportunities and Training Schemes." A. G. Beverstock. George Hotel, King St, 7.15 p.m.

TRADE NOTES

Expansion. A. M. Lock and Co., Ltd., electronic engineers of Chadderton, Oldham, are extending their organisation. Their Works Service Department now occupies the whole of the premises in Crompton St, Chadderton, and new offices have been opened at Prudential Buildings, 79 Union St, Oldham, to accommodate the Sales and Accounts Division. A Sales and Service Department is to be established in Birmingham.

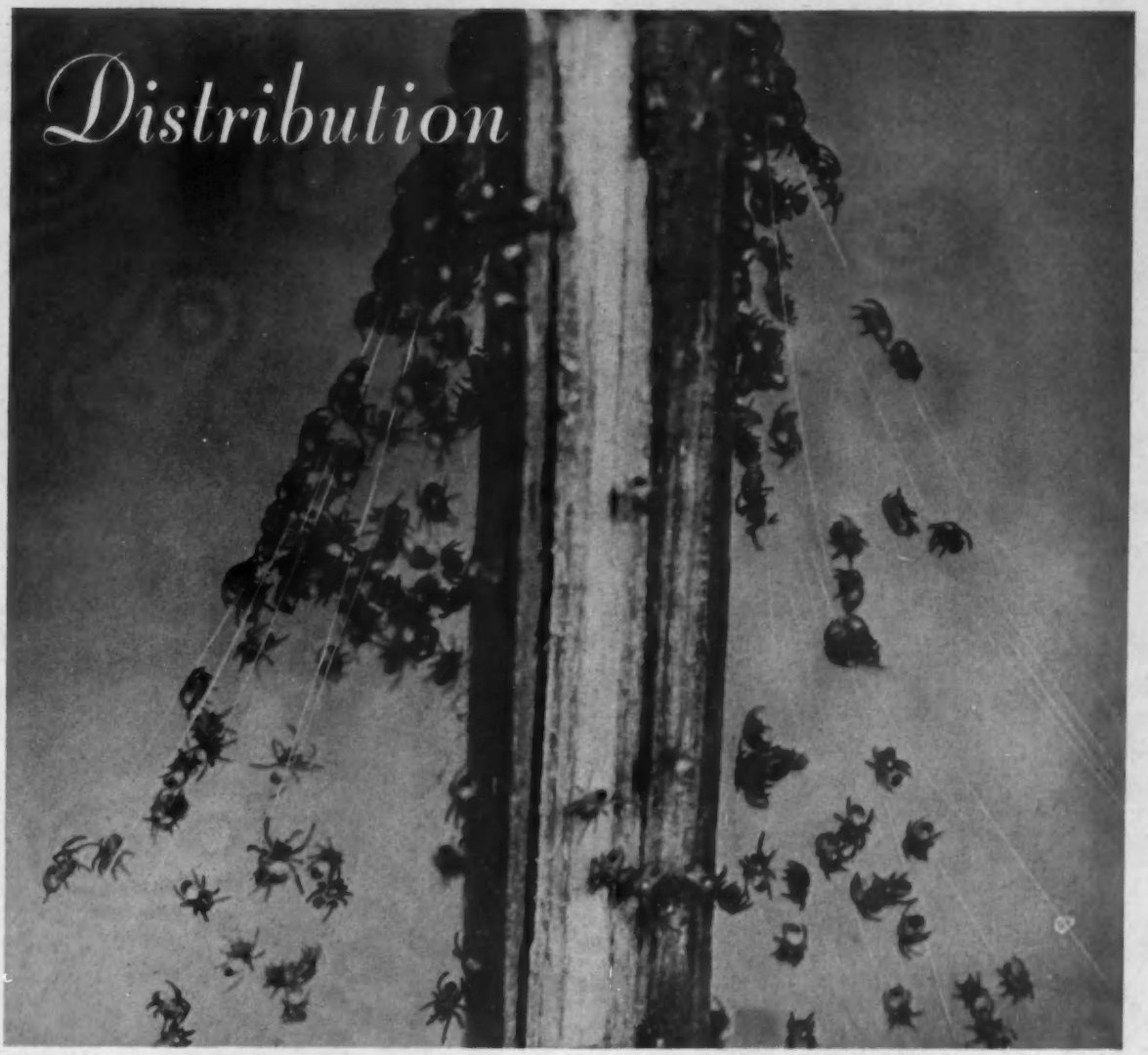
Showrooms Closure. Parnall-Yate Ltd. have now closed the Thor-Parnall showrooms and offices at 64/66 Oxford St, W.1. All communications should be addressed to the firm at 255 North Circular Road, London, N.W.10, pending the opening of new premises.

Irish Factory. The new premises of Moulded Products Ltd., at Tralee, Co. Kerry, was officially opened last week by Mr W. Norton, Minister for Industry and Commerce. Products to be made at the factory range from electrical accessories and radio parts, to car components and furniture fittings.

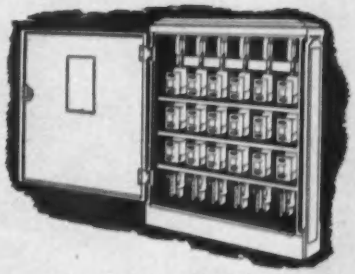
Clarification. H. W. Field and Son, Harold Wood, Essex, inform us that they are still manufacturing fluorescent lighting control gear, and with new impregnation plant now installed, can give improved delivery. (Rumours of a cessation of manufacture are completely erroneous.)

Reorganisation. The two Sunderland Works in the Richardsons Westgarth group are now to be run under the same management. Assets and obligations of the North Eastern Marine Engineering Co., and George Clark (Sunderland) Ltd., at South Dock and Southwick are to be merged in the George Clark Co., the name of which will be changed to George Clark and North Eastern Marine (Sunderland) Ltd.

New Phone No. The telephone number of the Fraser and Chalmers Engineering Works of the G.E.C. has been changed to Erith 3011.



Garden Orb Spinning spiders become globe-trotters at an early age. As soon as they emerge from their cocoon they climb to the top of whatever they are on, let out threads of silk and allow themselves to drift away. HENLEY'S Distribution—this time of electricity—is achieved by methods just as ingenious and rather less haphazard. Which is why engineers in every continent rely on HENLEY equipment.



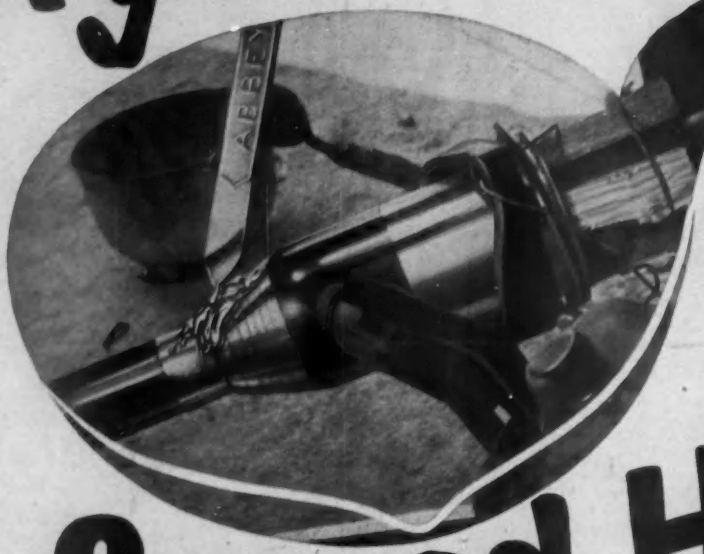
DWARF TYPE DISTRIBUTION PILLAR.
Send for Catalogue 22/2.

Electrical Distribution Equipment

by HENLEY

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

Fry's Solders



Fry's solder was the natural choice for plumbing the gland of this isolator to the 0.25 sq. in. 11 kV cable. Fry's ABBEY brand solder quickly softens to the ideal "buttery" consistency.

Served Here

The pure metal content and balanced composition ensure fast operation and elimination of loss and excessive dripping.

Here, the ABBEY is ladled to the joint for wiping. The smooth flow, the freedom from pinholes and blemishes on cooling, are typical of this top grade solder by Fry's.

FRY'S Metal Foundries Limited

Tandem Works, Merton Abbey, London, S.W. 19 Telephone: MITcham 4023

And at MANCHESTER · GLASGOW · BRISTOL & DUBLIN

CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

PUBLIC NOTICES

ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS

Presidential Address

"HYDRO-ELECTRIC DEVELOPMENTS IN NORTH SCOTLAND"

A meeting will be held in the Lecture Theatre, Institution of Electrical Engineers, London, W.C.2, on Tuesday, 18 Oct., 1955, when Mr Bryan Donkin, B.A.(CANTAB.), M.I.E.E., M.AMER.I.E.E., M.SOC.C.E.(FRANCE), the President of the Association, will deliver his Address and present A.S.E.E. Awards.

The meeting will commence at 6.30 p.m. preceded by light refreshments, served from 6 p.m.

Some tickets are available and early application for these should be made to: The General Secretary, Association of Supervising Electrical Engineers, 23 Bloomsbury Sq, London, W.C.1.

(V 400p)

TENDERS INVITED

SOUTHAMPTON C.B.C.

invites TENDERS from Electrical Contractors for Electrical rewiring and improvement at Portswood Secondary Junior and Infants' School. Forms and particulars from the Borough Architect on £1 deposit by 10 Oct., 1955. R.I.B.A. Contract plus Supplementary Conditions available for inspection. Deposit refunded on receipt of bona fide Tender not subsequently withdrawn or return of documents. Tender to Town Clerk, Civic Centre, Southampton, by 10 a.m. Tuesday, 25 Oct., 1955. (V 401)

NORTHAMPTON

STREET LIGHTING

CONTRACTORS wishing to tender for the installation of approximately 1,100 Class B Street Lamps, comprising erection only of steel columns and supply and erection of 150/100 W tungsten lanterns, etc., should apply to the Borough Engineer, Guildhall, Northampton, enclosing crossed cheque (payable to Northampton Corporation) for £2. 2s. which will be returned if a bona fide tender is received before 10 a.m. on 24 Oct.

C. E. VIVIAN ROWE,
Town Clerk.
(V 391)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

CITY OF LEEDS

TENDERS FOR STREET LIGHTING TO GROUP "A" STANDARD

Contract No. 1 (*a*, *b* and *c*) Scott Hall Rd and Harrogate Rd.

Contract No. 2 (*a*, *b* and *c*) Easterly Rd.

TENDERS are invited for the supply and/or erection of Lighting Columns and Lanterns as follows:

Contract Numbers

1A—2A Supply and delivery of 298 and 175 respectively 140 W non cut-off gear enclosed sodium lanterns.

1B—2B Supply and delivery of 298 and 169 respectively 25 ft mounting height reinforced concrete columns and brackets.

1C—2C Unloading, erection and wiring up of items to be supplied against preceding contracts, together with sundry work of a similar nature.

Specifications, Bills of Quantities, and Forms of Tender may be obtained from the Street Lighting Engineer, Street Lighting Department, Springwell St, Leeds 12, on deposit of Two Guineas which will be returned on receipt of a bona fide Tender not subsequently withdrawn. Plans and Conditions of Contract may be inspected at the same office during normal working hours.

The Contracts are each in Three Parts and Contractors are invited to offer for any part or all.

Tenders in a sealed envelope endorsed "Street Lighting" and bearing no name or mark to indicate the sender must reach the Town Clerk, Room 57, Civic Hall, Leeds 1, not later than 12 noon on Saturday, 5 Nov., 1955.

The Corporation reserve the right to treat each Bill of Quantities as a separate Tender and do not bind themselves to accept the lowest or any Tender.

L. A. DOXEY,
Street Lighting Engineer.

Street Lighting Department,
Springwell St, Leeds 12. (V 419)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

CENTRAL ELECTRICITY AUTHORITY

South Eastern Division

FIRST ASSISTANT CHEMIST—Littlebrook Power Station. Applicants should preferably possess B.SC. degree or equivalent and have had experience in field testing, water analysis and lubricating oil testing. Experience of modern Power Station installations an advantage. Class L, Grade 9, £900/£975 per annum plus London Allowance. Applications giving details of education, present position, experience, etc., should be sent to the Station Superintendent, Littlebrook Power Station, Near Dartford, Kent, to arrive by 15 Oct. (V 408)

YORKSHIRE ELECTRICITY BOARD

Head Office

Chief Engineer's Department

THIRD ASSISTANT ENGINEER—DISTRIBUTION DESIGN (SUBSTATIONS)

THE successful applicant will be required to assist with the design of indoor and outdoor substations operating at voltages of 33 kV and above, the selection of protective gear and the preparation of specifications and enquiries for substation plant.

Applicants should preferably be Corporate Members of the Institution of Electrical Engineers and possess a University degree in electrical engineering. They should have a good general knowledge of substation plant and some experience in the design or construction of large high voltage substations would be an advantage.

Salary—N.J.B. Schedule C, Class AX-EX, Grade 4, £750/£25/£875, rising to £975 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees should be forwarded to the Secretary, Head Office, Yorkshire Electricity Board, Scarcroft, Leeds, not later than 20 Oct., 1955.

No. 6 (Hull) Sub-Area

Goole District

FIRST ASSISTANT DISTRICT ENGINEER

Applicants should be experienced in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution networks, substation plant and ancillary apparatus.

The successful applicant will be responsible to the District Engineer and must be capable of preparing complete schemes and estimates. He will be required to reside in the Goole District and undertake standby duty.

Applicants should be Corporate Members of the Institution of Electrical Engineers, or possess equivalent qualifications.

Salary—N.J.B. Class E, Grade 5, £790/£20/£850 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Kingston-upon-Hull, not later than 20 Oct., 1955.

No. 5 (Wakefield) Sub-Area

Barnsley District

THIRD ASSISTANT DISTRICT ENGINEER

Applicants must have had a sound practical training and considerable experience in the construction, operation and maintenance of H.V. and M.V. Overhead and Underground Distribution Network, Substation Plant and Ancillary Equipment.

Applicants should hold a current driving licence, and be prepared to reside in the District and undertake standby duties.

Preference will be given to those who are Corporate Members of the Institution of Electrical Engineers, or who hold equivalent qualifications.

Salary—N.J.B. Class F, Grade 9, £675/£15/£720 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 20 Oct., 1955.

No. 4 (Leeds) Sub-Area

Wetherby District

THIRD ASSISTANT DISTRICT ENGINEER

Applicants should possess a good general and technical education and training and have had experience in the construction, operation and maintenance of E.H.T. and L.T. overhead and underground distribution systems in a mixed urban and rural district.

The successful applicant will be stationed at the Wetherby Office and should be prepared to reside in that district.

Salary—N.J.B. Class E, Grade 9, £635/£15/£680 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, near Leeds, not later than 20 Oct., 1955. (V 423)

CENTRAL ELECTRICITY AUTHORITY
London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or C. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.MECH.E. for posts (*a*) and Corporate Membership for posts (*b*) an advantage.

(*a*) ASSISTANT SHIFT CHARGE ENGINEER
BARKING C GENERATING STATION

Vacancy No. 55/774

Extensive experience necessary in operation of modern high pressure turbine and boiler plant, E.H.T. switchgear and in administration and control of labour. Preference given to those with P.F. experience. Salary—Class J, Grade 9=£829. 10s. per annum.

(*a*) ASSISTANT SHIFT CHARGE ENGINEER
BOW GENERATING STATION

Vacancy No. 55/775

Applicants should have served an apprenticeship and obtained H.N.C. in Electrical and/or Mechanical Engineering or equivalent, and should have had experience in the operation of boiler and turbine plant in generating stations. Salary—Class F, Grade 9=£708. 15s. per annum.

(*a*) ASSISTANT ENGINEER (OPERATION)
DEPTFORD EAST GENERATING STATION

Vacancy No. 55/776

Successful candidate will assist in operation of Boiler House and Turbine House. Salary—Class K, Grade 12=£750. 15s. per annum.

(*a*) ASSISTANT SHIFT CHARGE ENGINEER
GROVE ROAD GENERATING STATION

Vacancy No. 55/777

Sound engineering and technical training necessary with practical experience in Generating Station operation. Salary—Class F, Grade 9=£708. 15s. per annum.

(*a*) STATION SHIFT CONTROL ENGINEER
ST. MARYLEBONE GENERATING STATION

Vacancy No. 55/778

Practical experience in Control Room operation necessary. Salary—Class E, Grade 10=£624. 15s. per annum.

(*b*) SECOND ASSISTANT ENGINEER
(GROUP III GENERATION)

Vacancy No. 55/779

Applicants should be familiar with operational requirements of modern Generating Stations. Knowledge of salary and wage agreements for Electricity Industry an additional qualification. Appointment offers opportunity for experience in executive and administrative functions, and duties will include analysis of returns and programmes, and investigation of engineering problems. Successful candidate will be required to assist the Group Generation Engineer (Operation) in matters relating to control of a large group of stations. Salary—Class AX/EX, Grade 2, £997. 10s./£1,125, rising to £1,245 per annum.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, Central Electricity Authority, London Division, P.O. Box 136, Generation House, Great Portland St, W.1, and be received within 14 days of this advertisement. (V 418)

LONDON ELECTRICITY BOARD
CONTRACTING SECTION

VACANCIES exist for THREE ASSISTANTS in the Board's Contracting Section situated in Central London.

Applicants should have experience in preparing estimates for large industrial and similar installations, a good knowledge of contract procedure and experience in electrical installation work. Technical education to H.N.C. or O.N.C. standard would be an advantage.

Commencing salary will be within the range of £720/£840 per annum according to technical qualifications, experience and ability.

Application forms obtainable from Personnel Officer, 46/7 New Board St, London, E.C.2, to be returned completed by 20 Oct., 1955. Please enclose addressed envelope and quote ref.: PER/V/1993/T. (V 416)

STATION ENGINEERS (G.D.) AND STATION ENGINEERS (MECH.)

required by Air Ministry at Royal Air Force and Ministry of Transport and Civil Aviation stations. Qualifications required (*a*) Ordinary National Certificate in Electrical or Mechanical Engineering or show that an equivalent standard of technical education has been reached, (*b*) recognised apprenticeship in electrical or mechanical engineering with firm or establishment of good repute, (*c*) three years' employment in electrical or mechanical engineering, preferably on operation and maintenance of mine, factory or workshop plant and services. Preference given to applicants who have had supervisory duties subsequent to (*b*) and (*c*). Work will consist of installation, operation and maintenance of high and medium voltage electrical distribution systems, electrical installations, generating plant, steam and hot water heating systems and miscellaneous works plant tools and equipment. Commencing salary according to age, qualifications and experience on range from £565 to £812. Liability for tours of duty overseas for which special allowance payable in addition to higher salary. Appointments non-pensionable. Only natural born British subjects. Write, giving age, full details of qualifications and experience to AB.1255, London Appointments Officer, Ministry of Labour and National Service, 1-6 Tavistock Sq, W.C.1. No original testimonials should be sent. Only candidates selected for interview will be advised. (V 336)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Norfolk Sub-Area

Gt. Yarmouth District
DEMONSTRATOR

171/55.R

Candidates should have had domestic science training including Electrical Housecraft, should preferably have E.A.W. certificate and be competent to plan and give cookery demonstrations, including lectures and advice to consumers on the use of domestic electrical appliances.

Salary—N.J.C. Grade 1 (£425/£525), although progress beyond £465 will be subject to certificate that the person concerned is capable of undertaking all the duties of the grade.

Apply, by letter, within 14 days to the District Manager, Eastern Electricity Board, Regent Rd, Great Yarmouth, Norfolk.

Suffolk Sub-Area

COMMERCIAL ASSISTANT—COMMERCIAL REFRIGERATION

172/55.R

The appointment is for a salesman to specialise in commercial refrigeration equipment, to operate from Suffolk Sub-Area Headquarters, Stowmarket.

Candidates must be fully experienced in handling enquiries for all types of equipment, including food storage and milk cooling, must be capable of initiating business and must have a proved sales record.

Salary—N.J.C. Grade 3 (£585/£645).

Apply, by letter, within 10 days to the Secretarial Officer, Suffolk Sub-Area, Eastern Electricity Board, Finborough Hall, Stowmarket, Suffolk. (V 411)

CENTRAL ELECTRICITY AUTHORITY
South Western Division

STATION SHIFT CONTROL ENGINEER required at Portishead "A" Power Station.

Superannuation Scheme. Salary: N.J.B. Class J, Grade 10, £755/£800.

Applicants should possess good technical qualifications, and have had training and experience in the control and operation of steam generating plant and main switchgear.

Applications on Form A.E.6/ACT, obtainable from your place of employment or the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 17 Oct., 1955. (V 407)

THE NORTH WESTERN ELECTRICITY BOARD
SECOND ASSISTANT DISTRICT ENGINEER, PRESTON DISTRICT

DUTIES will include the operation, maintenance and construction of underground and overhead mains, substations and transformers, and general mains work including standby duty. Applicants should state their experience in high voltage mains work. Preference given to applicants who hold the H.N.C. in Electrical Engineering.

Salary Scale: £790 x £20—£850 per annum, Grade G.7. N.J.B. Conditions.

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER (INSTALLATION AND SERVICING) LANCASTER

Duties will include estimating for and supervising electrical installation work in all classes of property; supervision of servicing and domestic repairs. Preference given to applicants with technical qualifications.

Salary Scale: £755 x £15—£800 per annum. Grade F.7. N.J.B. Conditions.

Applications for the above posts to the Sub-Area Manager, No. 4 Sub-Area, The North Western Electricity Board, 40/41 Lune St, Preston, by 15 Oct., 1955. (V 415)

CENTRAL ELECTRICITY AUTHORITY
Midlands Division

MAINTENANCE ENGINEER (Mechanical) is required at Hams Hall "B" Power Station, Nr. Birmingham. N.J.B. Service Conditions, superannuable appointment, salary within Schedule "A," Grade K6, £1,035/£1,125 per annum.

Applicants should have received a sound technical training and wide practical experience in power station mechanical maintenance problems. Appropriate technical qualifications an advantage.

Apply, quoting vacancy number 96MD on form AE6, available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, by 17 Oct., 1955. (V 435)

SOUTH EASTERN ELECTRICITY BOARD
FIRST ASSISTANT DISTRICT ENGINEER
Kingston and District

SALARY £840 x £20—£900 per annum plus London Allowance under N.J.B. Class F, Grade 5. Superannuable. The successful candidate, preferably a Corporate Member of the Institution of Electrical Engineers, will be expected to assist the District Engineer in the organisation and operation of a department which undertakes the planning, construction and operation of a department which undertakes the planning, construction and operation of a large urban network supplying 58,000 consumers with a maximum demand of about 55 MW. Experience on systems up to 33 kV an advantage and particular emphasis given for ability to organise work and control staff.

Applications, naming 2 referees, on forms from D. C. Thomson, B.SC., M.I.E.E., Kingston and District Manager, SEEBoard, 22 Claremont Rd, Surbiton, by 19 Oct., 1955.

ASSISTANT DISTRICT ENGINEER
Kingston and District

Salary £595/£640 per annum under N.J.B. Class F, Grade 11, plus London Weighting. Superannuable. Applicants should preferably hold the Higher National Certificate in Electrical Engineering or its equivalent, and have had practical experience in general distribution work on systems up to 11 kV.

Applications, naming 2 referees, on forms from D. C. Thomson, B.SC., M.I.E.E., Kingston and District Manager, SEEBoard, 22 Claremont Rd, Surbiton, by 19 Oct., 1955.

CARTOGRAPHIC DRAUGHTSMAN
Tunbridge Wells District

Salary within the range £525 x £20—£585 per annum under N.J.C. Grade 2. Applicants should have experience in the preparation of mains records, development plans and substation layout. Knowledge of Overhead Line Survey work an advantage.

Applications, naming 2 referees, to T. W. Dann, M.ENG., M.I.E.E., District Manager, SEEBoard, Town Hall, Tunbridge Wells, by 19 Oct., 1955.

A. L. BURNELL,
Secretary.
(V 417)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Southern Area

THIRD ASSISTANT DISTRICT ENGINEER (Hawick District). N.J.B. Grade B9, £515/£15/£560.

Applicants should have a sound technical training and experience in operation and maintenance of overhead and underground distribution systems. Technical qualifications desirable. Applications stating age, qualifications and experience, should reach the undersigned by Tuesday, 18 Oct.

G. H. SANKEY,
Area Manager.
P.O. Box No. 2,
High St, Galashiels. (V 409)

CENTRAL ELECTRICITY AUTHORITY
Yorkshire Division

APPLICATIONS are invited for the following appointments in the Technical Departments:

FOURTH ASSISTANT ENGINEERS (2) IN THE METER SECTION

Candidates should be experienced with bulk supply metering equipment and indicating instruments.

A FOURTH ASSISTANT ENGINEER IN THE COMMUNICATIONS SECTION

Experience with industrial applications of automatic telephone type equipment is desirable.

Applicants should have technical qualifications up to Higher National Certificate or equivalent. Works experience will be an advantage.

Commencing salary will be within the range £600/£725 per annum, Grade 6, Class AX, N.J.B. Agreement, Schedule C, according to qualifications and experience and will rise ultimately to a maximum of £805 per annum (Class EX).

Applications forms obtainable from Divisional Secretary (Establishments), Central Electricity House, St. Mary's Rd, Leeds 7, to be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
(V 412)

LONDON ELECTRICITY BOARD

STRUCTURAL ASSISTANTS AND STRUCTURAL DRAUGHTSMEN

APPLICATIONS are invited for the above positions in the Construction Branch of the Chief Engineer's Department in Central London.

Applicants for the positions of Structural Assistants in the Civil Engineer's Section should be experienced in the design and detailing of reinforced concrete, and/or steel framed superstructures and foundations.

Applicants for the positions of Structural Draughtsmen should have a knowledge of building construction requirements and/or some experience in detailing reinforced concrete or steel structures.

The posts are graded under Schedule D, National Joint Board Agreement, as Grade 5—£672/£777 and Grade 6—£535. 10s./£661. 10s. per annum respectively, inclusive of London Allowance. Commencing salaries will be dependent on qualifications and experience.

Application forms obtainable from Personnel Officer, 46/7 New Broad St, London, E.C.2, to be returned completed by 25 Oct., 1955. Please enclose addressed envelope and quote ref.: V/2003/T. (V 396)

CENTRAL ELECTRICITY AUTHORITY
South Eastern Division

ASSISTANCE MAINTENANCE ENGINEER (Mechanical) Croydon "B" Power Station. Applicants should possess Higher National Certificate or equivalent and have had experience in the maintenance of high pressure turbine and boiler plant and auxiliaries appertaining to a large modern Power Station. N.J.B. Conditions of Service, Class J, Grade 9, £790/£850 per annum plus London Allowance.

Written applications giving details of education, present position, experience, etc., should be received by the Station Superintendent, Croydon "B" Power Station, Beddington Farm Rd, Croydon, Surrey, not later than 15 Oct., 1955. (V 379)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ENGINEERING DRAUGHTSMEN required in the Board's No. 1 Sub-Area Headquarters, 24 Hatton Gar, Liverpool 3.

Salary within the range £510/£630 per annum (N.J.B. Schedule D, Grade 6) according to qualifications and experience. Previous experience in the layout of electrical switchgear and substations would be advantageous, and applicants should be in possession of not less than the Ordinary National Certificate.

The appointments are superannuable and subject to medical examination.

Application forms obtainable from the Manager, No. 1 Sub-Area, at the above address. Closing date: 17 Oct., 1955. (V 382)

NORTH WESTERN GAS BOARD
Northern Group

CHIEF ACCOUNTANCY ASSISTANT

APPLICATIONS are invited for the above pensionable appointment at a salary within Grade 11 of the National Salary Scales, viz.: £785/£910 per annum.

Applicants should be qualified accountants and have a sound knowledge of financial management and cost accounting in the Gas Industry and be capable of supervising the accountancy activities in the Group.

Applications giving age, details of qualifications and experience, and the names of two referees should reach the General Manager, North Western Gas Board, Northern Group, St. George's Quay, Lancaster, within 14 days of the issue of this advertisement. (V 395)

CENTRAL ELECTRICITY AUTHORITY
South Eastern Division

GENERAL ASSISTANT ENGINEERS (CONTROL)

APPLICATIONS are invited for the above positions at (1) Croydon "B" Power Station and (2) Kingston "B" Power Station. Applicants should preferably have had experience in the operation of E.H.T. Switchgear and the parallel running of alternators. N.J.B. Conditions of Service, Class J, Grade 17, and Class G, Grade 15, respectively £475/£520 per annum plus London Allowance. Detailed written applications giving education, present position, experience, etc., should be received by the following not later than 15 Oct., 1955.

(1) Station Superintendent, Croydon "B" Power Station, Beddington Farm Rd, Croydon, Surrey.

(2) Station Superintendent, Kingston "B" Power Station, Downhall Rd, Kingston-on-Thames, Surrey. (V 380)

SENIOR ASSISTANT ENGINEER
(Electrical)

required by Metropolitan Water Board for the permanent pensionable staff. Salary scale (at present under review) £970—£30—£1,090. Commencing salary according to age and experience. Maximum age 45 years. It is a condition of the appointment to and the holding of the position that the selected candidate shall be and continue to be a subscribing corporate member of the Institution of Electrical Engineers. Applicants must have had experience in the design, arrangement, preparation of specifications and assessments of tenders for high tension substations; high tension motors, generators and control gear up to 3,000 h.p.; low tension motors, generators and control gear; and associated wiring and cable work.

Housing accommodation may be available, if required, in a good neighbourhood, at an inclusive rent of approx. £130 per annum. A form of application may be obtained from the undersigned on receipt of a stamped addressed foolscap envelope, quoting reference (G.P.2), and completed applications must arrive not later than 4 Nov., 1955. Canvassing disqualifies and relationship to any member, officer or employee must be disclosed.

S. D. ASKEW,
Clerk of the Board.
Offices of the Board, New River Head, Rosebery Ave, London, E.C.1. (V 394)

CANADIAN WESTINGHOUSE COMPANY LIMITED
Hamilton, Canada

requires ELECTRICAL and MECHANICAL ENGINEERS. Graduate or Associate Members of the Institutions of Electrical or Mechanical Engineers. Electrical Engineers with a minimum of 5 years' experience in the design of switchgear, circuit-breakers, power transformers, induction motors or D.C. rotating machinery. Application or Design Engineers skilled in variable voltage drives and closed cycle regulating systems. Mechanical Engineers with a minimum of 5 years' experience in the design of heavy rotating equipment. Electronic Engineers—design engineers with experience in circuitry and development of communications equipment, micro-wave, radar, naval, ordinance, communications, etc. Westinghouse offers in addition to an attractive salary and security assistance to locate in Canada, in outstanding Pension Plan, Opportunity for Advancement, low cost life, sickness and accident insurance with hospital and surgical benefits. For complete details and an application form write to: Canadian Westinghouse Co., Ltd., Mr M. J. McAuliffe, c/o Government of Canada, Department of Labour, 61 Green St, London, W.1. Personal interviews will be arranged during November. (V 424)

ADMIRALTY

ELECTRICAL ENGINEERS

THE Civil Service Commissioners invite applications from men for either (*a*) Main Grade or (*b*) Basic Grade posts. Age at least 30 for (*a*) and 25 for (*b*) on 1 Oct., 1955.

Candidates must have a University Degree with first or second class honours in Engineering, but exceptional other qualifications considered if particularly suitable. A minimum of two years' practical training followed by three years' (eight years for (*a*)) practical experience in a responsible electrical engineering post, or equivalent experience, essential.

Salary (for 45½-hour week in London): Main grade £1,263/£1,620; starting pay above minimum in exceptional cases. Basic grade—starting pay £766 (at age 25) up to £1,020 (at 33 or over); special increase of £75 on certain conditions. Maximum £1,207. Somewhat lower in provinces. Promotion prospects. Particulars and application forms from Civil Service Commission, Scientific Branch, 30 Old Burlington St, London, W.1, quoting S.210/55. Completed forms to be returned by 10 Nov., 1955. 7932/110/9/55/SD. (V 406)

THE NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments, subject to N.J.B. Agreement for Electricity Supply Industry:

York Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER, Whitby District. Salary Schedule A, Class B, Grade 7—£595/£640.

THIRD ASSISTANT DISTRICT ENGINEER, Scarborough District. Salary Schedule A, Class E, Grade 9—£635/£680.

Applicants must be qualified electrical engineers with sound practical training and experience in the construction, operation and maintenance of overhead and underground networks and associated plant and equipment.

Harrogate Sub-Area

THIRD ASSISTANT ENGINEER, Sub-Area Headquarters.

Applicants should have had experience in construction of H.V. and L.V. overhead lines. Duties include field surveys and plotting of results, preparation of profile drawings and pole schedules for overhead line construction.

Salary Schedule A, Class G, Grade 10, £675/£720.

Applications stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne 1, within ten days of the appearance of this advertisement. (V 392)

CENTRAL ELECTRICITY AUTHORITY
Southern Division

APPLICATIONS are invited for the following positions:

STATION SUPERINTENDENT, COWES GENERATING STATION, ISLE OF WIGHT
S/13.739

Applicants should have received a thorough technical and practical training followed by wide experience in the operation and maintenance of generating station plant and have also held a position of responsibility involving the control of technical and administrative staffs. Preference will be given to corporate members of one of the senior professional engineering institutions, or those holding similar qualifications.

Salary N.J.B., Class E, Grade 1, £1,035 x £30/£1,125.

MECHANICAL MAINTENANCE ENGINEER—PORTSMOUTH GENERATING STATION
S/13.740

Applicants should have had considerable experience in the maintenance of generating station mechanical plant, and must be capable of controlling staff, and planning and supervising mechanical plant maintenance. Candidates should be corporate members of an appropriate professional institution, or hold qualifications leading to such membership.

Salary N.J.B., Grade G.7, £790 x £20—£850.

GRADE 10 ENGINEER, POOLE GENERATING STATION
S/13.741

The successful candidate may be called upon to perform the duties of a station shift control engineer, to assist on maintenance work, or to perform general station duties. Operating experience of modern generating station plant is essential.

Applicants should have had a sound technical training and should possess qualifications leading to corporate membership of an appropriate professional institution.

Salary N.J.B., Grade J.10, £775/£800.

GRADE 9 ENGINEER, SOUTHAMPTON GENERATING STATION
S/13.742

Applicants should have had previous experience in a modern generating station, and manufacturing works experience will be an advantage. Preference will be given to those who either possess qualifications and experience leading to corporate membership of a recognised professional institution, or who are studying for the examination of such an institution.

The successful candidate may be required to undertake duties in either the boiler house or the turbine room.

Salary N.J.B. Grade F.9, £675 x £15—£720.

Special application forms for each of the above posts obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, should be returned by 19 Oct., 1955. Please quote reference SVN. (V 433)

GOVERNMENT OF KENYA
ELECTRICAL ENGINEER
PUBLIC WORKS DEPARTMENT, KENYA

DUTIES are to act as Government's Technical adviser in all matters relating to Electricity Supply undertakings.

Appointment is on contract in the salary range £1,032/£1,620 per annum gross. A gratuity at the rate of 13½% of salary is payable on satisfactory completion of contract. Free passages on appointment and on leave for the officer, his wife and children up to a maximum cost of 3 adult passages. Leave is granted at the rate of 4-5 days for each month of resident service.

Candidates should be under 45 years of age and must have passed or be exempt from Sections A and B of the examination for A.M.I.E.E. Previous experience with an Electricity Supply undertaking, a firm of consulting engineers, the Electricity Commission or an Electrical Inspector of Factories would be an advantage.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith St, London, S.W.1, giving briefly age, qualifications and experience. Mention the reference number BCD 112/7/027. (V 397)

THE EAST MIDLANDS ELECTRICITY BOARD
Lincolnshire Sub-Area
ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the position of Engineering Draughtsman in the Drawing Office at the Lincolnshire Sub-Area Headquarters.

Candidates should have a good general and technical education, together with experience in Plant layout for Outdoor and Indoor Substations, particularly 33 kV; Network and Circuit diagrams; Sag-Tension calculations and Mains Records.

In the absence of the Senior Draughtsman the successful candidate will be required to take charge of a small Drawing Office.

The commencing salary will be in accordance with Grade 6, Schedule D—£510/£630 per annum of the salary scale of the National Joint Board according to experience and qualifications.

Applications giving full particulars of age, present position, qualifications and experience, should be submitted to the Manager, Lincolnshire Sub-Area, North House, Grantham, within 14 days of this advertisement. (V 378)

SOUTH WESTERN ELECTRICITY BOARD
Taunton Sub-Area

APPLICATIONS invited for post of JOINTER (E.H.T.) in the Sub-Area Headquarters Maintenance Department at Taunton. Experience of jointing on 33 kV mains desirable, but applicants with 11 kV experience who are willing to undertake a training course in E.H.T. jointing will receive consideration.

Wages (at present 49d. per hour) and conditions of employment in accordance with N.J.I.C. Agreement for the Electricity Supply Industry.

Applications, in writing, to the Manager, Taunton Sub-Area, Electricity House, The Parade, Taunton, within seven days of the appearance of this advertisement. (V 420)

LONDON ELECTRICITY BOARD
TECHNICAL ASSISTANT, DESIGN AND PLANNING BRANCH

APPLICATIONS are invited for the above position in the Board's Western Sub-Area situated in Central London.

Applicants should have had a sound technical education up to Higher National Certificate standard, and possess practical experience in H.V. and M.V. A.C. Distribution practice. They should be capable of dealing with technical correspondence and of preparing estimates. The successful candidate will be required to share in standby duties.

The post is graded under Schedule A of the National Joint Board agreement as Class L, Grade 13—£750, 15s. per annum, rising to £798 per annum, inclusive of London Allowance.

Application forms obtainable from Personnel Officer, 46/7 New Broad St, London, E.C.2, to be returned completed by 17 Oct., 1955. Please enclose addressed envelope and quote ref.: PER/V/2047/T. (V 393)

CENTRAL ELECTRICITY AUTHORITY
North West, Merseyside and N. Wales Division

APPLICATIONS are invited for the post of SENIOR DRAUGHTSMAN (Mech.) in the Construction Department, Springwood House, Woolton, Liverpool. Applicants should have a good general and technical education, preferably possess H.N.C. in engineering, and experience in a Drawing Office associated with the layout of turbo-alternator sets and ancillary plants would be an advantage.

The successful applicant will be required to prepare drawings and diagrams associated with power station plant and equipment, and check contractors' drawings. Salary within the range £750 x £20—£850 (Grade 4, Schedule D).

Applications stating age, experience and present position should be sent to the Divisional Secretary, Central Electricity House, 825 Wilmslow Rd, Manchester 20, without delay. Please quote vacancy No. E.255/364/T. (V 414)

CENTRAL ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following posts:

GENERAL ASSISTANT ENGINEER BRIMSDOWN GENERATING STATION

Salary Class J, within the range of Grade 17/14, £475/£640 per annum plus London Weighting.

Duties include assisting in the Electrical Control Room and experience in the technical operation of electrical, boiler house, and turbine house plant, testing, etc., in a Generating Station and provide a suitable basis for promotion to higher technical grades.

Manual workers in skilled grades with suitable technical training will be considered. Previous experience in a Generating Station and/or technical training to the standard of the Ordinary National Certificate or its equivalent will be of advantage.

Applications stating age, qualifications and experience should be sent to the Controller, Central Electricity Authority, Eastern Division, Northmet House, Southgate, London, N.14, by 15 Oct., 1955.

W. N. C. CLINCH,
Controller.
(V 383)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

South Staffs and North Worcs Sub-Area
THIRD ASSISTANT ENGINEER (SHIFT CONTROL)—(OCKER HILL CONTROL CENTRE)

The successful applicant will be responsible to the Control Engineer for directing and supervising District and Sub-Area staffs in the operation of the Transmission and Distribution systems within the Sub-Area. Applicants should have a good knowledge of system operation and loading. Experience in the operation of Supervisory Controlled Substations would be an advantage. Salary £840/£900 per annum (N.J.B. Class "L", Grade 10).

Apply in writing, within fourteen days, stating age, experience, present position and salary, to Mr T. G. Keeler, Sub-Area Manager (Ref.: CW), Midlands Electricity Board, P.O. Box No. 9, Toll End Rd, Tipton.

North Staffs Sub-Area
SECOND ASSISTANT DISTRICT ENGINEER (LEEK DISTRICT)

Candidates should have had a sound technical education and experience in the construction, maintenance and operation of overhead and underground networks up to and including 33 kV. Technical qualifications desirable. Salary £715/£760 per annum (N.J.B. Grade E.7).

Apply in writing, within fourteen days, stating age, qualifications, present position and salary to, District Manager, Midlands Electricity Board, Station St, Leek, Staffs.

Central Gloucestershire Sub-Area
THIRD ASSISTANT DISTRICT ENGINEER (DEAN FOREST DISTRICT)

Duties involve the construction, maintenance and operation of E.H.V. and L.V. mains and substations, and planning of system reinforcements and mains extensions. Technical qualifications desirable. Salary £635/£680 per annum (N.J.B. Grade E.9).

Apply in writing, within fourteen days, stating age, experience, present position and salary, to District Manager, Midlands Electricity Board, Highfield Hill, Lydney, Glos.

Shropshire and Herefordshire Sub-Area
GENERAL ASSISTANT DISTRICT ENGINEER (LEOMINSTER DISTRICT)

The successful applicant will be required to assist in the construction and maintenance of E.H.V. and L.V. Overhead and Underground mains. Technical qualifications desirable. Salary £515/£560 per annum (N.J.B. Grade C.10).

Apply in writing, within fourteen days, stating age, experience, present position and salary, to Mr W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

A. STEPHENS,
Secretary.
(V 413)

CENTRAL ELECTRICITY AUTHORITY
East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

ASSISTANT ENGINEER
(COAL AND ASH PLANT)
CASTLE DONINGTON POWER STATION

Vacancy No. 166/55/ET

Applications are invited from suitably qualified Engineers, with a wide experience of operation and maintenance in a large Power Station with P.F. Boilers.

The successful applicant will be responsible for the programming of coal traffic and for the operation of the Coal and Ash Plants.

The salary will be in accordance with the National Joint Board Agreement, Class L, Grade 8 (£975 x £25—£1,050 per annum).

Closing date for receipt of applications, 21 Oct., 1955.

ASSISTANT SHIFT CHARGE ENGINEERS
CASTLE DONINGTON POWER STATION

Vacancy No. 167/55/ET

Applications required from suitably qualified Engineers who have had sound experience in the operation of modern high pressure Generating plant.

The salary will be in accordance with Class L, Grade 9 (£900 x £25—£975 per annum).

Closing date for receipt of applications, 21 Oct., 1955.

GENERAL ASSISTANT ENGINEER, NORTH WILFORD POWER STATION, NOTTINGHAM

Vacancy No. 162/55/ET

Duties are mainly to assist in the Station Control Room on shift, and to carry out such other operation and investigation duties as may be required.

Applicants should have had some previous experience in a Generating Station and preference will be given to those who hold the Higher National Certificate, or who are at present pursuing a course of study with the object of obtaining this or a similar qualification.

The salary will be in accordance with the National Joint Board Agreement, Class K, Grade 18 (£475/£520 per annum).

Closing date for receipt of applications, 14 Oct., 1955.

SHIFT CHARGE ENGINEER
LEICESTER POWER STATION

Vacancy No. 169/55/ET

Candidates should be in possession of the H.N.C. in Electrical Engineering or equivalent and have had previous experience in the operation of a large pulverised fuel fired station.

Salary will be in accordance with Class H, Grade 7 (£840 x £20—£900 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 21 Oct., 1955.

SENIOR DRAUGHTSMAN (CIVIL)
CONSTRUCTION DEPARTMENT

Vacancy No. 164/55/ET

Candidates should have experience in the preparation of detail drawings and in the design of one or more of the following subjects:

Reinforced concrete structures.
Piled and slab foundations for heavy components.
Cable subways, bridges and culverts.

The salary will be in accordance with Grade 4 (£750 x £20—£850 per annum) or Grade 5 (£640 x £20—£740 per annum) of Schedule D of the National Joint Board Agreement.

Closing date for receipt of applications, 14 Oct., 1955.

GENERAL ASSISTANT ENGINEERS
SPONDON POWER STATION, NEAR DERBY

Vacancy No. 165/55/ET

Two General Assistant Engineers are required at Spondon Power Station where suitable young men will be given the opportunity to obtain operating and maintenance experience at this Power Station.

Preference will be given to Candidates who hold the Higher National Certificate, or who are at present pursuing a course of study with the object of obtaining this or a similar qualification.

The salary will be in accordance with the National Joint Board Agreement, Class H, Grade 16 (£475/£520 per annum).

continued in next column

continued from previous column

Closing date for receipt of applications, 14 Oct., 1955.

These appointments will be pensionable within the terms and provisions of the Central Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on Form AE6/ACT which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.
(V 425)

COUNTY BOROUGH OF BURTON UPON TRENT EDUCATION COMMITTEE
Technical College

Principal: E. White, M.SC.(ECON.)

APPLICATIONS are invited for the post of Grade B Teacher of Electrical Engineering (Light Current) with Mathematics as a subsidiary subject.

Salary will be in accordance with the Burnham Technical Report, and the successful candidate will be required to pass a medical examination.

Forms of application, which may be obtained from the undersigned upon receipt of a stamped, addressed foolscap envelope, must be returned immediately.

A. H. BLAKE,
Director of Education.
Education Office,
Guild St, Burton upon Trent. (V410)

CENTRAL ELECTRICITY AUTHORITY
Midlands Division

THIRD ASSISTANT ENGINEER (Statistics) is required in the Generation (Operation) Department at Headquarters, Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule C, Grade 4, commencing in range £750/£875, rising to £950 per annum.

Applicants should have received a sound technical training and practical experience in the operation and maintenance of power station plant, and should preferably have a recognised qualification.

Apply, quoting vacancy number 95MD, on form AE6, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 22 Oct., 1955. (V 422)

SOUTH OF SCOTLAND ELECTRICITY BOARD

SHIFT CHARGE ENGINEER—DALMARNOCK

APPLICATIONS are invited for the position of Shift Charge Engineer at Dalmarnock Power Station.

The post will be superannuable and the salary in accordance with Grade 7, Class J. Applicants should have attained the Higher National Certificate in electrical or mechanical engineering and have had power station control room experience.

Applications on the appropriate form should be sent to J. Meek, Secretary, 351 Sauchiehall St, Glasgow, before 15 Oct., 1955.

J. MEEK,
Secretary.
(V 421)

CENTRAL ELECTRICITY AUTHORITY
Southern Division

APPLICATIONS are invited for the following post:

ASSISTANT ENGINEER (ELECTRICAL MAINTENANCE) PORTSMOUTH GENERATING STATION

S/13.732

Applicants should have had appropriate experience in modern generating station, and manufacturing works experience will be an advantage.

Candidates should have a sound technical training, and possess or be studying for qualifications leading to corporate membership of an appropriate professional institution.

Salary: N.J.B. Grade G.10, £675 x £15—£720.

Special application forms obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, should be returned by 12 Oct., 1955. Please quote reference ET. (V 381)

SOUTHERN ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER
(TELEPHONES)

NO. 1 (SOUTHALL) Sub-Area Engineering Department, Waterloo Rd, Uxbridge, Middlesex. Salary N.J.B. Class L, Grade 10, commencing at £882 per annum, inclusive of London Allowance, rising to £945 per annum. N.J.B. Conditions of Service.

The person appointed will be responsible for the construction, testing and maintenance of a private communications system owned and maintained by the Board, and for the testing and maintenance of switchgear and transformer supervisory equipment.

Applications on forms obtainable from the Sub-Area Secretary, 2/6 Windmill Lane, Southall, and returned to him in envelopes suitably endorsed, not later than 21 Oct, 1955.

SUPERVISOR, PUNCHED CARD SECTION

No. 3 (Portsmouth) Sub-Area Accountant's Department. Salary N.J.C. Grade 6 (£795/£870 per annum). N.J.C. Conditions of Service.

The person appointed will be required to organise and supervise the staff and the operation of a large Punched Card Installation dealing with electricity billing and expenditure. Extensive practical accountancy experience will be an advantage to an applicant.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed, not later than 21 Oct., 1955.

REFRIGERATION REPRESENTATIVE

Oxford District of No. 2 (Newbury) Sub-Area. Salary N.J.C. Grade 3 (£585/£645 per annum). N.J.C. Conditions of Service.

Candidates should have experience of commercial refrigeration applications, be able to prepare specifications and estimates, conduct negotiations and obtain new business.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, and returned to him in envelopes suitably endorsed, not later than 21 Oct., 1955.

The successful candidates for the above appointments will be required to contribute to the C.E.A. and Area Boards' Superannuation Scheme if eligible. (V 434)

BATTERSEA POLYTECHNIC
London, S.W.11

APPLICATIONS are invited from graduates of a British University, with industrial experience, for the post of LECTURER in Power Engineering to teach students of B.SC.(ENG.) standard. Salary in accordance with the London Burnham Technical Scales less statutory deductions, £1,001 or £1,013 x £25—£1,113. Further particulars from the Clerk to the Governing Body by whom applications should be received as soon as possible. (V 398)

A MAN of character and ability combined with experience and a desire to undertake responsibility is required for an important telephone cable sales and estimating department. Salary will be commensurate with experience and the appointment has good prospects, is permanent and pensionable. Typewritten applications should state salary expected and in chronological order details of experience with salaries received. All applications will be treated in the strictest confidence.—Box No. 4867, Electrical Times. (V 390)

CENTRAL ELECTRICITY AUTHORITY Research Laboratories, Leatherhead, require GENERAL ASSISTANT ENGINEERS. Candidates should have Higher National Certificate or equivalent qualification in electrical or mechanical engineering or physics. Duties include the maintenance of a wide range of specialised instruments. Salary N.J.B. Grade 5, £475/£650 per annum according to qualifications and experience. Applications stating age, qualifications, experience, present position and salary to D. Moffat, Director of Establishments, Winsley St, W.1, by 27 Oct., 1955. Quote Ref.: AE/673. (V 428)

The Guided Weapons Division

of

THE ENGLISH ELECTRIC

Company, Limited,

Luton

require one or two

SENIOR ENGINEERS

with inventive ability and a flair for original thinking.

They will be required to study Missile Systems, with a view to being able ultimately to propose new systems.

A broad Engineering experience with particular emphasis on Feed Back Systems, both Mechanical and Electrical, is desirable.

The appointments are permanent and offer full scope for initiative in an expanding organisation.

A salary commensurate with the qualications required will be paid. Staff Pension Scheme. Applications to Dept. C.P.S., 336/7 Strand, W.C.2,

quoting Ref.: 254Z.

(V 427p)

ASSISTANT ELECTRICAL ENGINEER, age 20/27, with good knowledge of industrial lighting and power layouts required by large manufacturing firm in West London area. Apply giving full particulars of qualifications and experience to—Box No. 4873, Electrical Times. (V 436)

COMMERCIAL ELECTRICAL ENGINEER required by Merchant Company for Malaya. Minimum qualification O.N.C.; age up to 24; bachelor. Commencing total emoluments not less than £875 per annum paid in Straits Dollars. Annual increments, Provident Fund, Pension Scheme, free furnished accommodation, passage provided. Write, Box No. 1465, c/o Abbotts, Eastcheap, London, E.C.3. (V 384)

DESIGNERS required with experience of D.C. or A.C. Dynamo-electric machines. Must be capable of using initiative. Applications should mention age and details of technical education and experience. Positions are progressive. All applicants will be interviewed at their convenience and expenses paid. Replies should be addressed to the General Manager, Lancashire Dynamo and Crypto Ltd., Trafford Park, Manchester 17. (V 439)

DESIGNERS with initiative required for D.C. or A.C. rotating machines by well-known firm in N.W. England. Should be capable of taking responsibility and working with little supervision. The posts offer good prospects. Interviews will be arranged to suit applicants' convenience, expenses refunded. Write stating full details, age, experience, etc.—Box No. 4875, Electrical Times. (V 440)

DRAUGHTSMAN required for interesting work on design of machinery used in the Electric Cable and Wire Rope Making Industries. Higher National Standard preferred. Good salary, bonus and canteen facilities, B. and F. Carter and Co., Ltd., Albion Works, Waterloo St, Bolton. (V 387)

DRAUGHTSMAN (Electrical) required to assist Contract Engineers. Surrey Area, 20 miles London. Salary up to £750 per annum according to technical qualifications, ability and experience on outdoor switchgear layouts for 132 kV and above. Vacancies also for Juniors. Apply—Box No. 4845, Electrical Times. (V 326)

ELECTRICIANS required for high class work in the Home Counties. Permanency and good prospects for skilled tradesmen. David Thomson Elec. Eng. Ltd., 26 Albion Rd, Luton, Beds. Phone: Luton 4178. (V 437)

ELECTRICIANS required for work in Cyprus. Details of age, experience, etc. to—Box No. 4877, Electrical Times. (V 441)

ELECTRICAL Engineers and Contractors require an ELECTRICAL LAYOUT DRAUGHTSMAN for work in the Middle East.—Generous salary and allowances.—Box No. 4835, Electrical Times. (V 315)

ELECTRICAL ENGINEER required for the Middle East by Electrical Engineers and Contractors. Candidates should have a good technical background (preferably H.N.C. standard) with some drawing office experience and knowledge of networks and switchgear. This post affords excellent experience for the younger Engineer who, if suitable, will be offered a good position on his return to this country—Generous salary and allowances.—Box No. 4837, Electrical Times. (V 316)

ELECTRICAL ENGINEER, not above 35, for the design of electric, electro-hydraulic and electronic circuits particularly as applied to special machine tools. Preference given to man with practical experience and technical training to A.M.I.E.E. level. —Box No. 4865, Electrical Times. (V 389)

ELECTRICAL DRAUGHTSMEN (senior and junior) for design of industrial installations comprising power distribution, motor applications, lighting, and allied design work. Experience of Iron and Steel Works practice an advantage but not essential. Excellent working conditions; 5-day week; pension scheme. Application stating age, qualifications and salary required to Personnel Manager, Head, Wrighnson and Co., Ltd., Teesdale Iron Works, Thornaby-on-Tees. (V 327)

ELECTRICAL DRAUGHTSMAN wanted aged 25-35. Applicant should be conversant with plant layouts, schematic diagrams of connections, machine wiring and connection diagrams, ordering of electrical material and should have National Certificate or equivalent in Electrical Engineering. Permanent position with pension scheme. Apply to Distington Engineering Company Limited, P.O. Box No. 8, Workington, Cumberland, giving particulars of experience and salary required. (V 328)

ELECTRICAL ENGINEERS required by large Oil Company for service in Middle East, initially for 18 months, with good prospects of permanency. Should be suitably qualified and must have had experience in heavy industrial construction or maintenance. Bachelor preferred, aged limit 35. Good salary and allowances. Write giving details and quoting No. C.19, to Box No. 9193, c/o Charles Barker and Sons Ltd., 31 Budge Row, London, E.C.4. (V 404)

ENGINEERING DESIGNER required by large manufacturer; must have keen interest and good experience in the design of quantity produced domestic appliances, also a flair for the application of pressed sheet metal work to simple, easily produced constructions. A good knowledge of production engineering methods and vitreous enamelling work would be an advantage. This is a senior position with considerable responsibility which should provide a sense of purpose and achievement and an opportunity for an ambitious man to make substantial progress in this field. The job carries a good four-figure salary; pleasant working conditions. Pension Scheme, etc. Own staff already notified. Please give full details of experience to—Box No. 4853, Electrical Times. (V 369)

ENGLISH ELECTRIC

have vacancies for FUSEGEAR SALES and CONTRACTS ENGINEERS at their Liverpool Works. Young engineers having H.N.C. or equivalent qualifications and previous experience or a desire for experience in this field are invited to apply for these appointments which are pensionable after qualifying period.

Apply stating age, experience and qualifications to Dept. C.P.S., 336/7 Strand, W.C.2, quoting Ref. 443K.

(V 426p)

ENGINEER for Technical Engineering Department. Duties include the preparation of schemes for new thermal and nuclear energy power plants, both industrial and central, and also the technical analysis of existing plants. Candidates will be expected to provide evidence that their technical and practical background is such as will enable them to assess correctly a client's plant requirements and also to determine the suitability of plant offered by a manufacturer. The work involves a considerable knowledge of thermodynamics, fluid flow mechanics, physics and the application of these to power plant problems, for these reasons the possession of a good academic qualification in engineering is desirable. The successful candidate will be centred in London, but will be expected to undertake short visits to plant sites as required. Applications, giving details of training, qualifications and experience to date, for the above position, should be sent to the Personnel Officer, Ewbank and Partners Ltd., Engineering Consultants, 10/11 Grosvenor Place, London, S.W.1. (V 348)

ENGINEER required for duties in Contracts Dept., engaged on the preparation of switchgear tenders and their subsequent engineering. Apply The Power Equipment Co., Ltd., Kingsbury Works, Kingsbury Rd, N.W.9. (V 386)

ESTIMATING ENGINEER for A.C. and D.C. Switchgear Tenders. Must have experience of flat back and cubicle type gear. Particulars and salary required to Whipp and Bourne Ltd., Switchgear Works, Castleton, Rochdale. (V 429)

EVERSHED AND VIGNOLES LTD., require a JUNIOR TECHNICAL SALES ASSISTANT for their Instruments Division, to deal with technical correspondence. Excellent opportunities and rapid advancement for the right man. Minimum qualifications O.N.C. Elec. Eng. or equivalent. Write to Instruments Manager, Acton Lane Works, London, W.4. (V 402)

FIRM manufacturing a specialised product on the N.E. Coast requires the following personnel for its Research and Development Department.

(1) ELECTRICAL ENGINEER or PHYSICIST with Degree or Higher National Certificate and having some years' experience in electrical measurements, both at power and radio frequencies, particularly with reference to low loss insulation. The successful applicant will be expected to take charge of a small team and work on a variety of problems with a minimum of supervision.

(2) METALLURGIST or CHEMIST with knowledge of metallurgy. A Degree or equivalent professional qualification is desirable and applicants should have experience in corrosion, inorganic analysis and a knowledge of cold working and annealing of metals.

A contributory Superannuation Scheme is in operation and a five-day week is worked. Applicants should write giving full details of their qualifications and experience, and all replies will be treated in the strictest confidence.—Box No. 4871, Electrical Times. (V 432)

WORKS DIRECTOR

ENFIELD CABLES LTD. are seeking a WORKS DIRECTOR, with seat on Board, to take charge of the Company's factories. Must be a professional engineer with experience in modern production techniques. Preference will be given to a man who has been engaged in the cable industry. This is a top-level position and will carry a commensurate salary. Write, giving full details, to J. E. Sunderland, Director and General Manager, Enfield Cables Ltd., Brimsdown, Enfield, Middlesex. (V 304p)

FOREMAN required for Cable laying work in Hertfordshire. Apply to Charles Ball Ltd., Letchworth. Phone 944. (V 438)

GRADUATES in Maths, Physics or Engineering are required for research and development work in telecommunications. They will be offered opportunities for advancement to senior executive appointments. Pension scheme. Applications, which will be treated in the strictest confidence, to ATCM, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. (V 430)

JUNIOR DRAUGHTSMAN required by London Electricity Board at Stratford, E.15. 38-hour week. Alternate Saturday mornings. Canteen facilities. Commencing salary, based on age and experience, within scale £205/£525 per annum inclusive. Application forms from Personnel Officer, 46/7 New Broad St, E.C.2. Please enclose addressed envelope and quote ref.: GC/1387/T. (V 385)

JUNIOR ENGINEER for work on the development of X-ray equipment and allied electronics. Experience on transformers desirable. Graduate or H.N.C. Electrical. Write giving full details to the Personnel Officer, Philips Balham Works Ltd., 45 Nightingale Lane, Balham, S.W.12. (V 399)

RECTIFIER DESIGN ENGINEER is required for work of exceptional interest and good prospects, in department handling all technical aspects of power rectifier equipments of the mercury arc, mechanical, and germanium types, and all associated application engineering (including railway, electrochemical, rolling mill, and general industrial purposes), and giving very wide engineering experience. Previous rectifier experience not needed, but applicants should have degree or equivalent, and some practical training. Excellent residential and educational district. Apply in writing, giving detailed particulars, to Manager, Rectifier Engineering Department, British Thomson-Houston Co., Ltd., Rugby. (V 244)

SALES REPRESENTATIVE London and Home Counties, required by Manufacturers of wiring accessories and L.T. distribution equipment. Technical education and experience essential. Knowledge of installation practice advantageous. Field selling experience necessary. Car driving and correspondence. Medical examination. Salary, commission, contributory pension, expenses and car provided. Informative letter with photograph please to—Box No. 4869, Electrical Times. (V 431)

SWITCHGEAR DRAUGHTSMEN

required for switchgear design and development up to 11 kV. Workshop experience and O.N.C. minimum required. Apply in writing giving details of age, experience and salary required to: Whipp and Bourne Ltd., Switchgear Works, Castleton, Rochdale. (V 236p)

SHOWROOM MANAGER. Electrical retailers and contractors in mid-Kent town require competent Showroom Manager. Salesmanship experience essential, knowledge of electrical retailing desirable. Apply, stating salary required to—Box No. 4839, Electrical Times. (V 323)

TRANSFORMER AND CAPACITOR DRAUGHTSMEN required.

(*a*) Senior men with experience on Power Transformers up to 10 MVA and 88 kV and Juniors with some experience up to 1,000 kVA.

(*b*) Draughtsmen with some experience on Power Capacitors.

Men who have had general electrical draughting experience will also be considered for training.

Write giving details of age, experience, qualifications and salary required to: The Technical Director, Bryce Electric Construction Co., Ltd., Kelvin Works, Hackbridge, Wallington, Surrey. (V 403)

WE are extending our activities and invite applications from REPRESENTATIVES with experience of the wholesale electrical trade in London. Payment is by salary and commission with approved expenses.

Applications which will be treated as strictly confidential should be addressed to our Sales Manager, Mr A. R. Yates, E. Dawson (Lamp Factors) Limited, 10 Grays Inn Rd, London, W.C.1. (V 165)

WELL-KNOWN Manufacturer of Street Lighting Equipment requires AGENTS working on commission basis in the following areas. North Eastern, Yorkshire, East Midlands, North Wales and North Midlands, Eastern England, London and South East, Southern England. Applicants must have good connections with area electricity boards and Borough Surveyors. Write in first instance giving details of experience, etc., to—Box No. 4863, Electrical Times. (V 388)

APPOINTMENTS WANTED

ELECTRICAL ENGINEER, A.M.I.E.E., varied experience, installation, maintenance plant, electronics, desires post as assistant to consultant or similar. Midlands and London.—Box No. 4827, Electrical Times. (V 299)

WANTED

WANTED ROTARY CONVERTERS, any size.—Universal, 221 City Rd, London, E.C.1. (V 2)

WANTED, for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady St, Bethnal Green, E.1. (V 1)

BUSINESSES FOR SALE

HARROGATE RECORD AND RADIO SHOP for sale. Spacious interior, new frontage. First class position in main shopping street. New lease, write—Box No. 4851, Electrical Times. Principals only. £1,850 plus s.a.v. (V 351)

WORK WANTED

A.C. and D.C. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx (V 3)

ARMATURE REWINDING service to the trade. Vacuums, Drills, Grinders, Hood Dryers, Dental Motors. Vacuum Cleaner and Drill Armatures replaced from stock 24-hour service. Every job guaranteed. All Vacuum Cleaner parts, hoses, bearings, etc., in stock for any make. Complete overhauls our speciality, Regam Electric Cleaner Service, 95/99 Park Lane, Leeds 1. (V 4)

LET US SOLVE YOUR BREAKDOWN PROBLEMS, repairs speedily carried out by experts. Collection and Delivery by our own transport. A. T. Robinson, Electrical Power Engineers, The Green, Southall, Middx. Southall 3494/5/6. (V 5)

PATENTS

THE proprietor of British Patent No. 603275, entitled Improvements in Apparatus for Automatic Telephone Systems, offers same for license or otherwise to ensure its practical working in Great Britain. Inquiries to Singer, Stern and Carlberg, Chrysler Building, New York 17, N.Y., U.S.A. (V 330)

BUSINESS OPPORTUNITIES

EXTRUSIONS BY MARLEY

Buyers requiring rigid and flexible tubes and sections in thermoplastic materials should ask for a quotation from Marley Extrusions, Dept. 123, Lenham, Maidstone, Kent. Harrietsham 3818. (V 121p)

FOR SALE

E. R.

By Direction of the Ministry of Works

at

The Ministry of Works Store
WATER LANE, CLIFTON, YORK
(Clifton, 2 miles from York Station)

SALE BY AUCTION
OF GOVERNMENT SURPLUS STOCKS IN SMALL LOTS WITHOUT RESERVE

and including

94 Electric Accelerator Pumps, Heating, 2 in., 3 in. and 4 in. bore, complete with starters. Friction Crane, complete; Jointers', Plumbers', Engineers' and Electricians' Tools and Accessories; Garden Tools; 5 Electric Motors, 1·5 to 5 h.p.; Fire Pump Spares; 350 Various Oil Stoves; 465 various Tables; 182 Folding Tables; 200 Lockers and Chests Drawers; 1,700 Chairs, various; Filing Cabinets; Plan Presses; 180 Beds, Metal folding; 308 White Blankets; 450 Coloured Blankets; 396 Mattresses; Canteen Equipment; 4 Safes; 9 Cycles; 78 Tarpaulins; Scaffolding Equipment and Boards; Waterproof Clothing; Duffle Coats, etc.

ON WEDNESDAY, 19 OCT., 1955
at 10 a.m.

VIEW on Monday and Tuesday, 17 and 18 Oct. from 9 a.m. to 4 p.m. and on Sale morning 9 a.m. to 9.45 a.m.

CATALOGUES SIXPENCE EACH (Admit 2 persons to view and Sale) from the Auctioneers:

STEPHENSON AND SON, F.A.I.,
20 Castlegate, York
Tel. 2513 and 53138

(V 442)

continued on page 70

INDEX TO ADVERTISERS

Adcola Products Ltd. 4
Aluminium Wire & Cable Co. Ltd. ... 24
Arrow Electric Switches Ltd. 3
Automat 42

Belling & Co. Ltd. 6
Benjamin Electric Ltd. 55
Bray, Geo., & Co. Ltd. 42
Britannic Electric Cable & Construction Co. Ltd. 43
British Driver-Harris Co. Ltd. ... 27
British Electric Resistance Co. Ltd. ... 22
British Insulated Callender's Cables Ltd. 23
British Thomson-Houston Co. Ltd. 58, 83
Brown, S. G., Ltd. 26
Brush Electrical Engineering Co. Ltd. 12, 13
Bryce Electric Construction Co. Ltd.... 56

Cable Makers Association 57
Cayson Electrics Ltd. 82
Central Electricity Authority 8
Cooper & Co. (B'ham) Ltd. ... Cover (ii)
Cox Walkers Ltd. 14
Crater Products Ltd. 2
Cressall Manufacturing Co. Ltd. ... 30
Crompton Parkinson Ltd. ... 11, 71

Dexion Ltd. 44, 45
D.S. Plugs Ltd. 74

Edge, Arthur, & Co. Ltd. 4
Eeto Insulations 26
Electrical Times Ltd. 84
Electro Dynamic Construction Co. Ltd. 5
Engineering & Lighting Equipment Co. Ltd. 81

English Electric Co. Ltd. ... 28, 31
Ensel Electric Co. Ltd. 78

Ferranti Ltd. ... ... Cover (i)
Fischer Bearings Co. Ltd. 35
Fluxite Ltd. 38
Fry's Metal Foundries Ltd. 62

General Cable Mfg. Co. Ltd. 43
General Electric Co. Ltd. ... 9, 60, 75
Genristo Ltd. 50
Grelco Ltd. 84
G.W.B. Furnaces Ltd. 46

Harboro' Rubber Co. Ltd. 14
Hardy & Padmore Ltd. 72
Heddesco Ltd. 50
Henley's, W. T., Telegraph Works Co. Ltd. 61, 76
Higgs Motors Ltd. 10

Imperial Chemical Industries Ltd. ... 49
Injection Moulders Ltd. 30
International Combustion Ltd.... ... 33
Isenthal & Co. Ltd. 42

Johnson & Phillips Ltd. 77

London Electric Firm Ltd. 84
Low, Duncan, Ltd. 2
Lyons, Claude, Ltd. 76

Martindale Electric Co. Ltd. 2
Mersey Cable Works Ltd. 73
Metafiltration Co. Ltd. 78
Metropolitan-Vickers Electrical Co. Ltd. 7
Metway Electrical Industries Ltd. ... 46
Mitchell Engineering Ltd. 86

Nalder Bros. & Thompson Ltd. ... 34
Nevelin Electric Co. Ltd. 53
Nife Batteries Ltd. 1

Oddie, Bradbury & Cull Ltd. 38

Panelec (Gt. Britain) Ltd. 82
Parmiter Hope & Sugden Ltd. Cover (iii)
Partridge Wilson & Co. Ltd. 48

Philips Electrical Ltd. 85
Pinchin, Johnson & Co. 84
Pirelli-General Cable Works Ltd. ... 41
Power Petroleum Co. Ltd. 32
Process Control Gear Ltd. 80

Radiovisor Parent Ltd. 38
Reyrolle, A., & Co. Ltd. 39
Rowlands Electrical Accessories Ltd. ... 52

Sankey-Sheldon Ltd. 21
Sax, Julius, & Co. Ltd. 50
Simmonds & Stokes (Niphan) Ltd. ... 82
Simon-Carves Ltd. 18
Simplex Electric Co. Ltd. 20
South Wales Switchgear Ltd. 16
Spencer Wire Co. Ltd. 80
Steels Engineering Products Ltd. ... 54
Sturdy Electric Co. Ltd. 76
Sunvic Controls Ltd. 17
Symons, H. D., Ltd. 74

Taylor, Tunnicliff & Co. Ltd. 40
Thermodare (Gt. Britain) 4
Thew, Edward H., Ltd. 14
Thompson, John, Water Tube Boilers Ltd. ... ... Cover (iv)
Thorn Electrical Industries Ltd. ... 15
Tucker, Geo., Eyelet Co. Ltd. 22
Tudor Accumulator Co. Ltd. 19
Turnright Controls Ltd. 70

United Ebonite & Lorival Ltd.... ... 36

Vaughan, W. R., Ltd. 79
Volex Electrical Products Ltd. 51

Wandleside Cable Works Ltd. ... 37
Wardle Engineering Co. Ltd. 47
Warm-Glow Co. Ltd. 59
Washers Ltd. 82
Westool Ltd. 29
Winn & Coales Ltd. 46
Wootton & Co. Ltd. 26

Yorkshire Electric Transformer Co. Ltd. 25
Yorkshire Switchgear & Eng. Co. Ltd. 72

continued from page 69

A.A. ELECTRICAL CO. for A.C.-D.C. MOTORS, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—Chi. 5105, 67 Rothschild Rd, W.4. (V 7)

A HIGH VACUUM IMPREGNATION UNIT or single or batch coil impregnation service to R.I.C. specification 214 or individual requirements.—Blickvac, Hamilton Rd Works, Hamilton Rd, S.E. 27. Tel. Gipsy Hill 4394. (V 12)

A.C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 5566-9. (V 8)

A.C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works Ltd., Milo Rd, East Dulwich, S.E.22. (Forest Hill 2278-9). (V 6)

FLUORESCENT SHELLS AND FITTINGS. Highest grade 5 ft Batten Shells with curved end covers from 9s. 6d. Lists of Shells and Fittings by return: Cowling and Holdsworth Limited, No. 1 Factory, Romside Trading Estate, North St, Romford. (V 15)

CHEAP BATTEN FITTINGS, 5 ft Hexagon 49s. 6d., Square 47s. 6d.; 4 ft 39s. 6d. and 37s. 6d. Complete with choke and starter, no tube. Carriage 2s. 6d. Bridisco (E.T.) 591 Green Lanes, London, N.8. (V 332)

ELECTRIC MOTORS, D.C. and A.C., Motor Generator Sets, Alternators and Dynamos. Reconditioned and guaranteed, very large stocks held.
Britannia Manufacturing Co., Ltd., Britannia Walk, N.1. CLErkenwell 5512-3-4. Stores at Cobham, Surrey. (V 13)

HOUSE SERVICE METERS, all types, can be obtained by return from Selectrics Dept. E.T., Castle Circus House, Torquay. Phone 7218. (V 14)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Rd, London, E.C.1. (V 9)

PURLEY CHOKES AND BALLASTS. Our 80-W tapped h.p.f. ballast with starter switchgear-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. W. Blanshard Ltd. (Dept. E.T.), Purley, Surrey. Uplands 4818-9. (V 11)

MERCURY SWITCHES are made by Hall, Drysdale and Co., Ltd., of 58 Commerce Rd, Wood Green, London, N.22. Tel.: BOW 7221. (V 10)

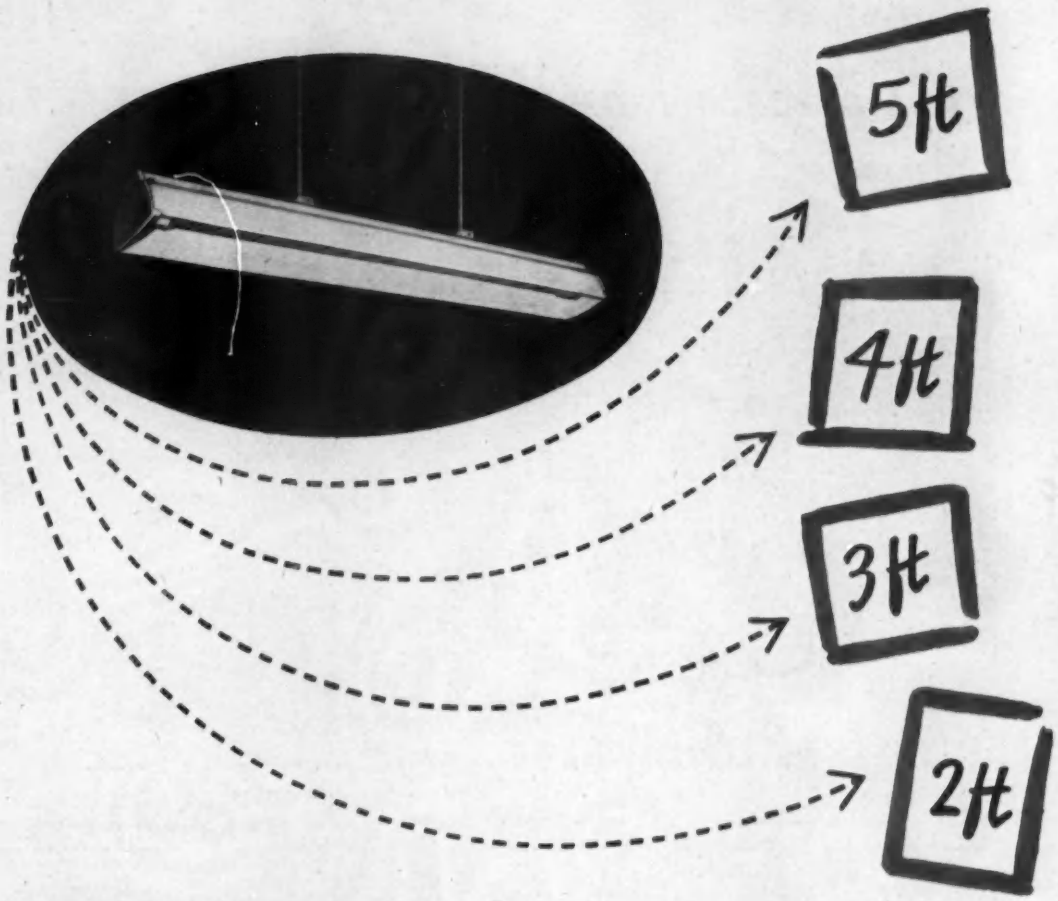
TIME SWITCHES from stock. Reconditioned or new. 12 months' guarantee. Lists from J. W. Hughes, 3 St. Thomas St, London Bridge, London, S.E.1. (Tel.: HOP 2759.) (V 16)

UNIVERSAL SEAM WELDER, W.S. 7U, with electronic control and attachments. Brand new condition. Price £2,500. Will accept near offer. Whittingham and Watt Ltd., Ashford Rd, Ashford Common, Middx. Ashford 4091. (V 405)

MISCELLANEOUS

LEARN ELECTRICAL ENGINEERING the practical way. Our new self-study course includes equipment on which experimental work can be carried out. Also courses for all professional examinations. Free brochure from E.M.I. Institutes, Dept. ET.57, London, W.4. (Associated with H.M.V.) (V 122)

For
COOKER SWITCHES
Consult



'New-Range' is now a wider range

The Crompton 'New-Range' industrial lighting fittings —so universally successful in 5 ft. designs— have now been extended to cover 4 ft. 40w., 3 ft. 30w., 2 ft. 20w. and 2 ft. 40w. sizes.

There are over 150 fittings (1 and 2-lamp) to meet different tasks and give you the benefits of 'New-Range' quality, appearance, standardisation and low cost of installation and maintenance throughout your factory.

The same standardised equipment can be used for either GENERAL or LOCAL lighting, cutting maintenance spares to a minimum of cost and space. 'Permawhite' corrosion-resistant finish, at no extra cost, is the standard treatment for all enamelled metal surfaces but porcelain enamel or 'Perspex' reflectors are also available for many of the fittings. Louvres may be used with all sizes.

Technical service and descriptive literature is at your disposal on enquiry at any Crompton Parkinson office.

Crompton 'NEW-RANGE'

Lighting Fittings for Industry

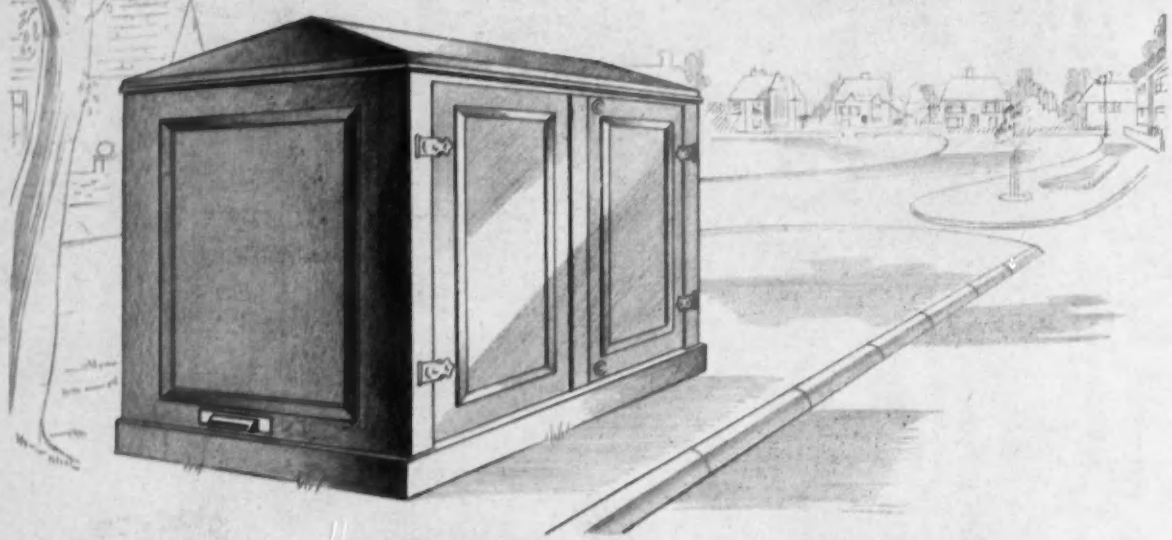
ELECTRICAL EQUIPMENT

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2. TELEPHONE: CHANCERY 3333

H

STEEL OR CAST IRON **KIOSKS** *IN ALL SIZES*

STRONG & PRACTICAL



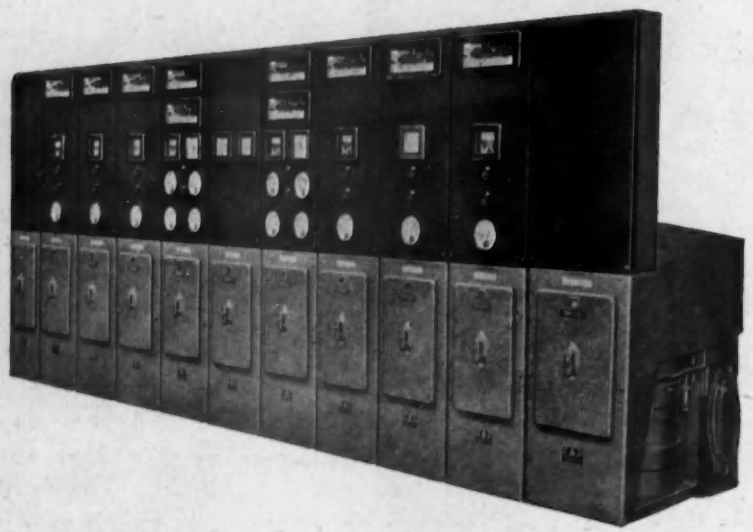
HARDY & PADMORE LTD., WORCESTER FOUNDRY, WORCESTER

Phone : Worcester 3215 Grams : "QUALITY," WORCESTER

M-W. 116

H.T. SWITCHBOARD

Typical 11 kV 250 MVA IVI switchboard embodying arc trapped circuit breakers for important industrial sub-station.



(Also for outdoor use)

YORKSHIRE SWITCHGEAR

& ENG. CO. LTD.

LEEDS • **LONDON**

ASSOCIATED WITH ELECTRO MECHANICAL MFG. CO. LTD., SCARBOROUGH

Whatever the project...

specify

MERSEY

QUALITY CABLES FOR LONG SERVICE

MERSEY CABLE WORKS LIMITED

LINACRE LANE · BOOTLE · LIVERPOOL 20

Telephone: BOOTLE 4111 (4 lines) *Telegrams "MERCABLES", LIVERPOOL 20*

A TI COMPANY

THE DS KING-PIN FUSED PLUG

CUT FUSE REPLACEMENT TIME TO 5 SECONDS

- Fuse immediately released by pressing hinged pin.
- No contact with wiring—no tools required.
- All pins removable for easy wiring.
- High quality durable materials throughout.
- Brown or ivory-white non-track plastic moulding.
- Retail Prices—Brown 3/6d. Ivory White 3/10d.

Catalogue D.S.P. 1, to B.S.S. 1363, is NOW available. Send for your copy.

No other fused plug has this outstanding feature...

PATENTED HINGED PIN to B.S.S. 1363

Patent No. 638780

IMMEDIATE DELIVERY!!

All D.S. Fused Plugs and Shuttered Sockets to B.S.S. 1363 now available from stock.

D.S. PLUGS LTD

MANCHESTER, 5 and SALTERBECK, WORKINGTON
ALSO AT LONDON, GLASGOW, BELFAST, LEEDS, CARDIFF, NEWCASTLE, BIRMINGHAM

Symons' Silicone Insulation

for Class H working

RESISTS BOTH EXTREMES OF TEMPERATURE

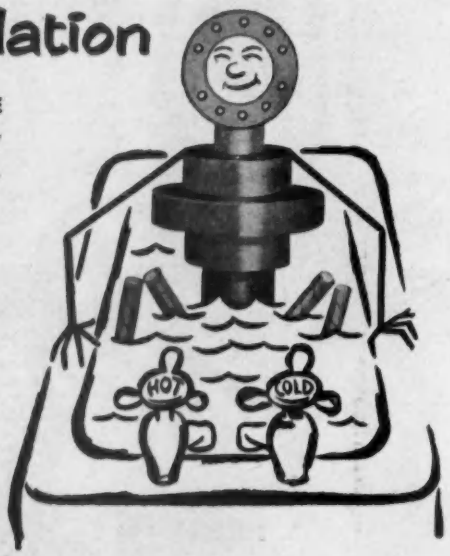
"SYMEL" silicone elastomer products can be used continuously at temperatures from —60°C to +180°C without deterioration.

"SYMEL" extruded silicone elastomer sleeving is available in sizes from .5m/m to 25m/m bore. Being completely homogeneous, it is moisture-proof, with good electrical properties in humid conditions.

"SYMEL" silicone elastomer coated glass and "Terylene"* are manufactured in thicknesses from 0.005" to 0.060", and are supplied as semi-cured or cured tapes, coated on one or both sides.

Please write for technical data sheets.

**The name "Terylene" is the property of I.C.I. Ltd., and is the name given to a particular Polyester fibre.*



For tested flexible insulation—say SYMONS for sure

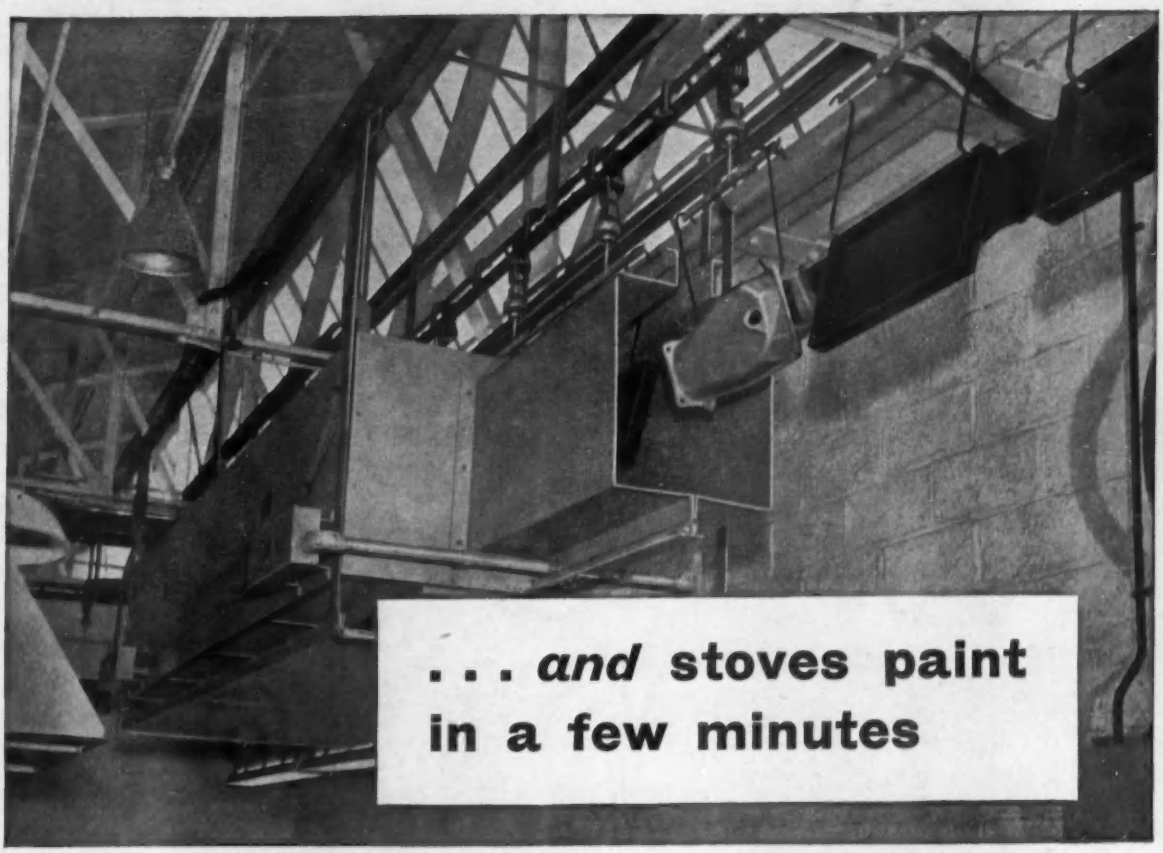
H.D. SYMONS & CO. LTD.

SYMONS' ADVISORY SERVICE
If you have an electrical insulation problem, send it to us! Our Test and Research Department will be pleased to advise you.

PARK WORKS · KINGSTON HILL · SURREY · Tel. Kingston 0091 · Grams. Insulation (Phone) Kingston-on-Thames

INFRA-RED PLANT OVERHEAD

saves floor space...



The overhead G.E.C. paint stoving installation at an East Moulscomb factory enables normal production to be carried out on the workroom floor while parts are being stoved overhead.

G.E.C.

RADIANT HEATING

Stoves paint speedily - perfectly - lastingly!

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON W.C.2.

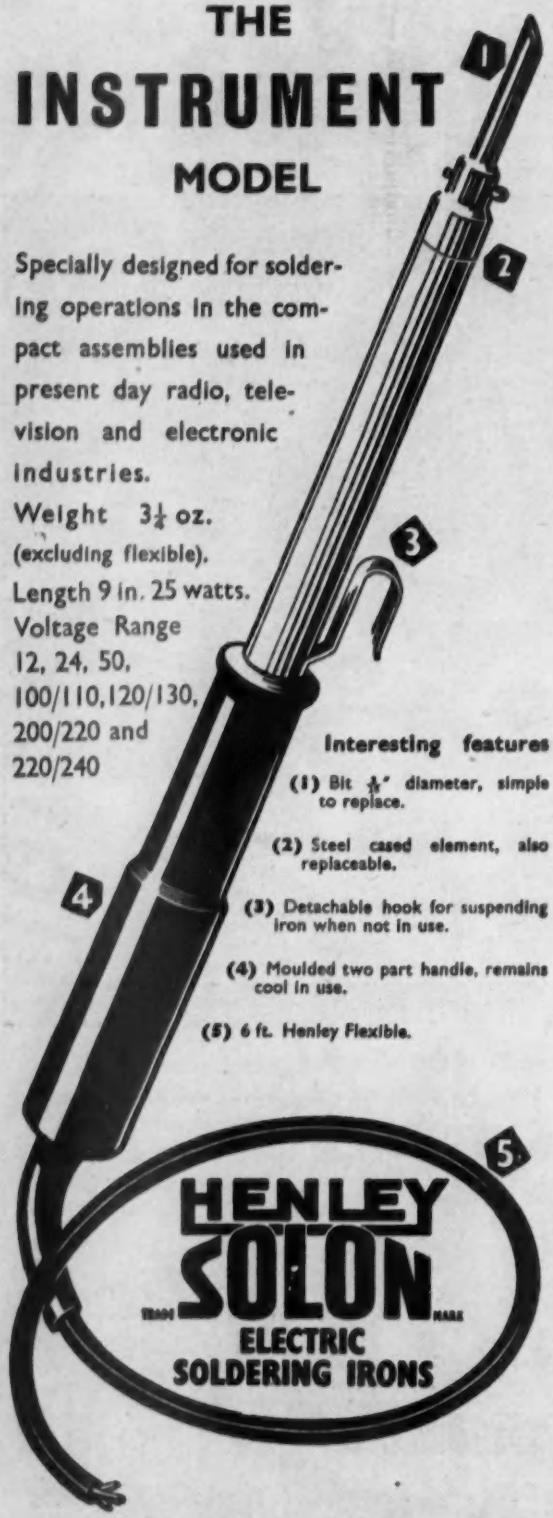
THE INSTRUMENT MODEL

Specially designed for soldering operations in the compact assemblies used in present day radio, television and electronic industries.

Weight 3¼ oz. (excluding flexible).

Length 9 in. 25 watts.

Voltage Range 12, 24, 50, 100/110, 120/130, 200/220 and 220/240



Interesting features

(1) Bit ¼" diameter, simple to replace.

(2) Steel cased element, also replaceable.

(3) Detachable hook for suspending iron when not in use.

(4) Moulded two part handle, remains cool in use.

(5) 6 ft. Henley Flexible.

HENLEY SOLON TRADE MARK ELECTRIC SOLDERING IRONS

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.
51-53 Hatton Garden, London, E.C.1

A NEW SMALL AUTOMATIC A-C VOLTAGE STABILISER

The ASR-1150 Weighs 11 lbs. Measures 8½ × 4½ × 5 Price only £24

This new Stabiliser will handle loads up to over 1 kilowatt—having an output of 5 amperes at (usually) 230 volts. As a general rule it weighs only about 1/10th of the so-common "choke-condenser" types offered by some competitors.

ASR-1150 is totally unaffected by changes in the mains frequency. It is also quite insensitive to load changes, working equally well from 0% to 100% full load (1.15 kVA). It has no large, high a-c working rating capacitors—which fail regularly in "resonated" types of Stabiliser, and which are very expensive to replace.

May we send you a copy of our new 20-page Supplementary Catalogue published July 1953. Just ask for Catalogue V-549-S.

ASR-1150 is merely one of an entirely new range of A-C Stabilisers, ranging from 200 VA to as high as 50 kVA—all dealt with in Catalogue V-549-S.

CLAUDE LYONS LTD

Electrical and Radio Laboratory Apparatus, Etc.
Head Office and Works: 76 Oldhall Street, Liverpool 3, Lancs.
Southern Factory: Valley Works, Ware Road, Hoddesdon, Herts.

ALWAYS SPECIFY STURDY TRANSFORMERS

and be certain of

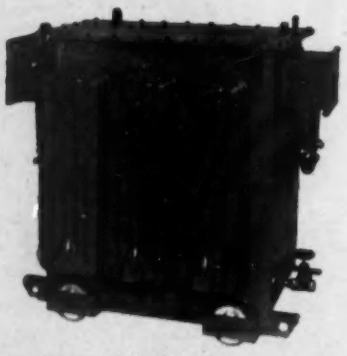
SATISFACTION

Sturdy Transformers are manufactured for all industrial applications from 1 kVA to 100 kVA.

They are being supplied regularly to Government Departments — N.C.B. C.E.A. and many large industrial users.

OUR MANY CUSTOMERS ARE OUR RECOMMENDATION

Our technical service is at your disposal.



Write for our illustrated brochure

STURDY ELECTRIC COMPANY LIMITED
BURNOPFIELD NEWCASTLE UPON TYNE

Telephone: Burnopfield 237

TIME IS THE FATHER OF TRUTH . . .

. . . Time shows the wisdom of choosing J. & P. cable.

Time proves the reliability of cable produced with the knowledge and experience gained during our 80 years as pioneers in the electrical industry. Specify J. & P. and your cable installations will be efficient for years . . and years . . and years.

J. & P. ARE FOUNDER MEMBERS OF THE CABLE MAKERS ASSOCIATION

ALL J. & P. BRANCHES STOCK . . .

322 TYPES AND SIZES OF V.I.R. CABLE

The mark that means that 'little more' in quality

JOHNSON & PHILLIPS LTD.
CHARLTON, LONDON, S.E.7
•
ELECTRICAL ENGINEERS AND CABLE MAKERS

THE *Eterna* LOUVRED FLUORESCENT FITTING

...introduced

for special use in stores, offices and showrooms is also suitable for industrial applications where appearance is equally important.

● In addition to the standard finish of hard gloss white, ETERNA Louvred Fittings are available in various colours and in the following sizes:—

4 ft. for TWIN 40 Watt Lamps
5 ft. „ „ 80 „ „
5 ft. „ THREE 80 „ „
5 ft. „ FOUR 80 „ „

● All ETERNA Louvred Fittings incorporate our well known Grade "A" H.P.F. Control Gear completely enclosed in chassis for dust exclusion. Side panels are of luminous glass removable for easy cleaning and lamp replacement. Provision is made for chain or conduit suspension.

● Other ETERNA models available. Also full range of Fluorescent Control Gear and Accessories.

ENSEL ELECTRIC CO. LTD.

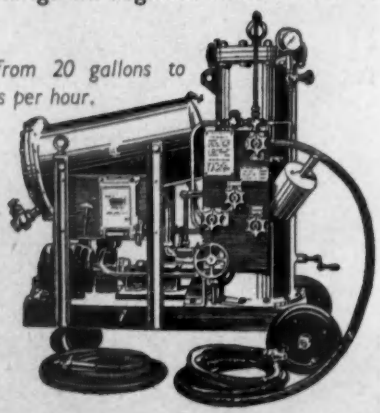
218-219 Upper Street, London, N.1 *Phone: CANonbury 2251/2*

ILLUSTRATED BROADSHEET FOR THIS AND OTHER 'ETERNA' FITTINGS AVAILABLE ON REQUEST.

TRANSFORMER AND SWITCH OILS

Complete Drying and Purification giving Maximum Breakdown Voltage in one simple operation. No heating. No fire risk. Weatherproof. Fully mobile units. Used by leading Electricity Undertakings throughout the World.

Capacities from 20 gallons to 1,000 gallons per hour.



METAFILTRATION

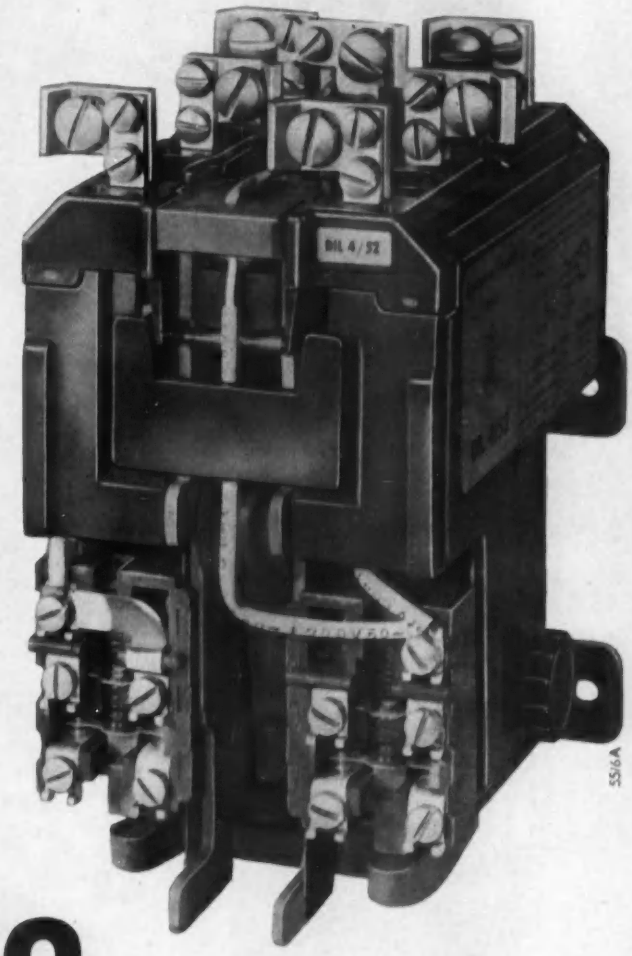
THE METAFILTRATION COMPANY LIMITED
BELGRAVE ROAD, HOUNSLOW, MIDDLESEX

★ *PHONE: HOUNSLOW 1121/2/3*
GRAMS: METAFILTER, HOUNSLOW

Original KLÖCKNER-MOELLER·BONN

ELECTRIC CONTROLGEAR
CONTROL CABINETS
DISTRIBUTION BOARDS

A New High Capacity Contactor



Airbreak Contactor

DIL 4/52

A Lifetime of Service Without Spares

TECHNICAL DATA

3 phase - 400/440/500 volts - 50 cycles	
Continuous rating	45 amperes
Starter rating	30 HP squirrel cage 30 HP slipring motor
Maximum rate	1800 operation per hour
Mechanical life	10 million operations
Electrical life	15 HP - 10 million operations 30 HP - 3 million operations
	Without replacement of contacts!

The insulation is laid out to comply with international standards for industrial switchgear up to 600 volts.

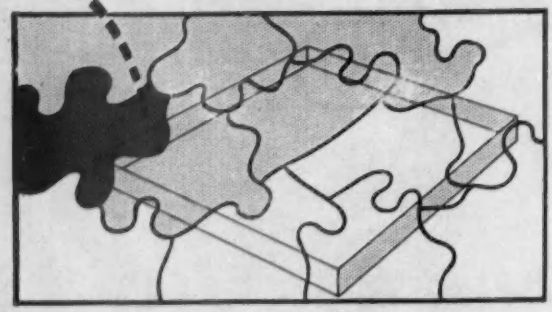
W. R. VAUGHAN LIMITED

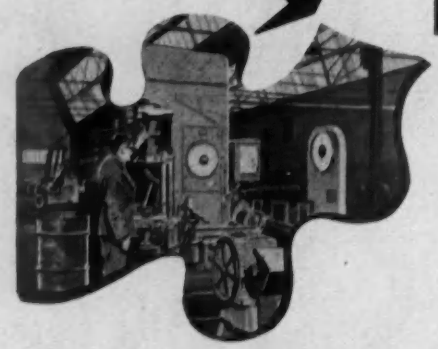
4, QUEEN STREET CURZON STREET
LONDON W1
TELEPHONE GROSVENOR 1571-2

MIDLANDS SHOWROOMS

J

STAGE by STAGE





We build up a picture!

● In this most important stage samples of wire undergo a series of tests on machines which accurately record every stress. It is twisted and 'stretched' to breaking point, its characteristics being carefully observed.

● *Manufacturers of High Carbon Steel Wire, Mild Steel Wire, Copper Wire and Aluminium Wire.*

Telephone: WAKEFIELD 3671 (6 lines)
Telegrams: SPENCER, TELE X, WAKEFIELD, 55.200

FOR OVER FIFTY YEARS WIRE MANUFACTURERS TO INDUSTRY

Spencers of Wakefield

PROSCON

Domestic Immersion Thermostats *(Type NU2)*

FULLY COMPLYING WITH BS.1555, FOR USE IN THERMAL STORAGE WATER HEATERS, IMMERSION HEATERS, CIRCULATORS, ETC. ATTRACTIVE IN APPEARANCE, EFFICIENT IN OPERATION, SOUNDLY DESIGNED.

Standard lengths: 7", 11" and 18". Ranges up to 190° F. can be supplied with metal Protecting Covers, etc.

Please send for LIST IT/353

PROCESS CONTROL GEAR LTD.
56 VICTORIA STREET · ST. ALBANS · HERTFORDSHIRE
TELEPHONE:- ST. ALBANS 2030 & 6689 TELEGRAMS:- PROCONGEAR, ST. ALBANS

A NEW DIE CASTING SERVICE BY ELECO

The service of Eleco's new and completely equipped gravity die casting foundry is now available to other industries.
Eleco's long and unique experience of precision casting has been gained over many years in the production of castings for all the famous Eleco lighting and other products. That vast accumulation of experience and research is at your service.

How Eleco can help you

The Eleco organisation is fully equipped, not only to supply you with gravity die castings of all kinds, but to carry out complete machining and finishing. Also to help with all kinds of sub-contracting for engineering and electrical work, of both light and heavy character.

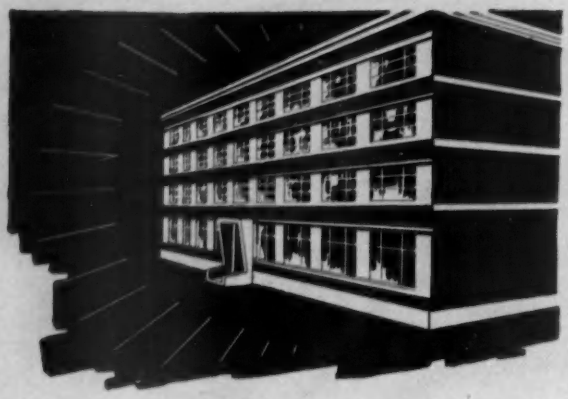
An invitation

You are cordially invited to submit your problems of design and service—Eleco engineers will be delighted to help you solve them.

ENGINEERING & LIGHTING EQUIPMENT CO. LTD.

DIE CASTING DIVISION, SPHERE WORKS, ST. ALBANS, HERTS.

ELECO



Daytime Heating...

is cheaper at night!

Panelec Embedded Electric Low Temperature Radiant Floor Warming provides efficient heating at a cost which is always comparable with, and often less than any available alternative form of heating ...

- *Consumes current only at night, taking full advantage of OFF-PEAK tariff.*
- *Saves space and simplifies building design.*
- *Reduces dust-carrying convection currents and banishes "Cold spots."*
- *Extends the life of furnishings and interior decorations.*
- *It is clean, healthy, safe and automatic—providing constant temperature control irrespective of external conditions.*

There are many applications of the Panelec Floor Warming System. If you have a heating problem, the chances are that Panelec can provide an effective and economical answer. Why not investigate the possibilities of using Panelec?—write for publication No. PAN.655D or discuss the matter with Panelec Technical Advisory Service. Our engineers will be pleased to help you.

REGISTERED "Panelec" TRADE MARK

N.B. "Panelec" is the original, registered trade name for this patented warming system, and can only be obtained from the address, shown here.

PANELEC (GREAT BRITAIN) LTD · 27 Hatchlands Road, Redhill, Surrey
Telephone: REDHILL 2461 (5 lines) PBX *Telegrams: MURELEC, REDHILL*

NIPHAN CABLE COUPLINGS

Specialists in the design and manufacture of

WEATHERPROOF METAL-CLAD

SOCKETS & PLUGS

5-300 amp. 250 to 500 volt. 3- & 4-pole earthed type, 2-pole, multi-pole, Single pole up to 600 amp. Designs to requirements.

For Electric Lighting Installations and Power Transmission, Communication, Portable Tools, etc:

C.I. Terminal Socket & Cover with terminal type sealing chamber and gland for cable.

C.I. Terminal Socket & Cover with through sealing chamber and glands for cable.

NIPHAN

Write for fully illustrated catalogue to:

SIMMONDS & STOKES (NIPHAN) LTD

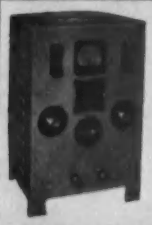
VICTORIA HOUSE, SOUTHAMPTON ROW, LONDON, W.C.1

'Phone: HOLborn 2163, 8637. 'Grams: Niphan, Westcent, London

WASHERS LTD.

93 IRVING ST. BIRMINGHAM 15
MIDLAND 1423

RECTIFIERS



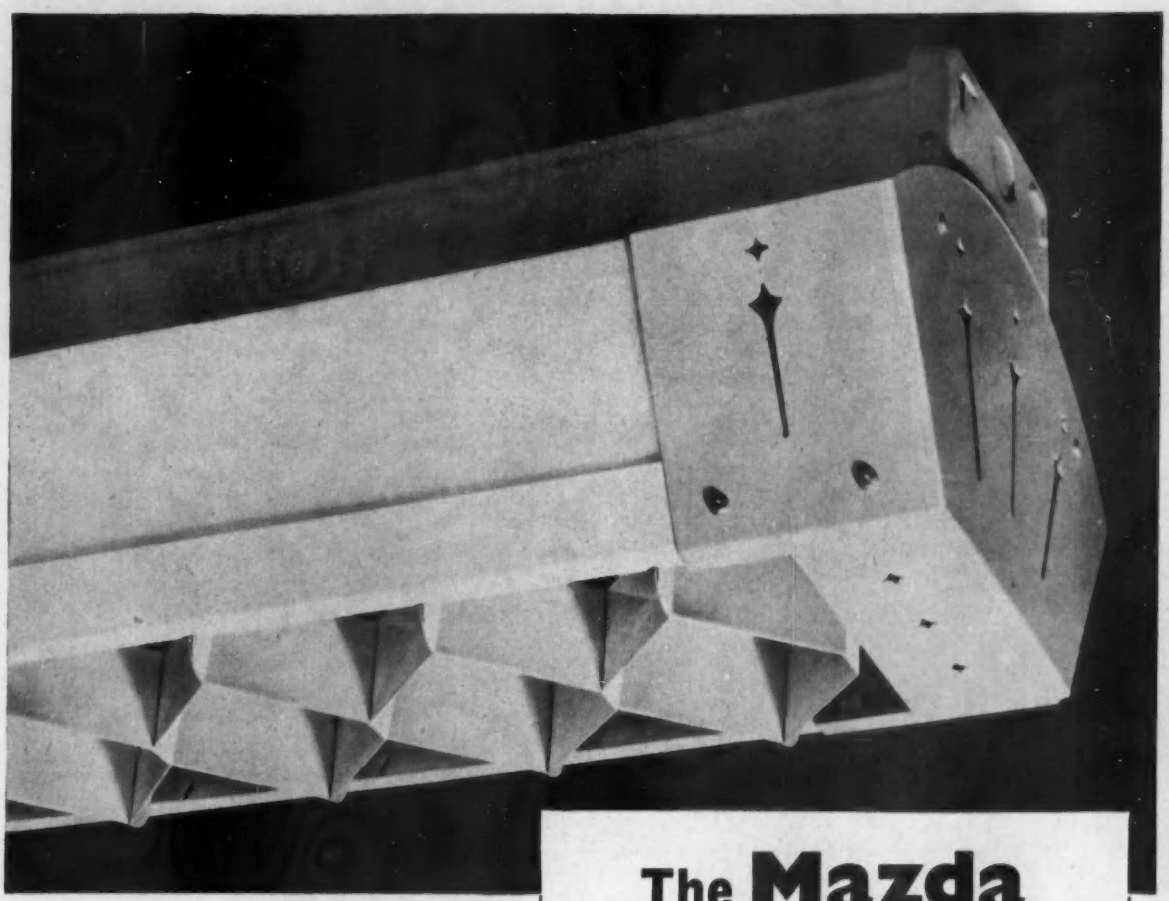
WITH METAL RECTIFICATION

For— **BATTERY CHARGING, ENGINE STARTING, LIFT CONTROL, SIGNALS, COMMUNICATIONS, LABORATORIES, etc. WE SHALL BE GLAD TO QUOTE FOR EQUIPMENT MADE TO SUIT YOUR OWN PARTICULAR PURPOSE**

PROMPT DELIVERY

CAYSON

CAYSON ELECTRICS LTD
QUEENS RD. WATFORD
Tel: WATFORD 7156 & 7177



This new Mazda Fluorescent Diffuser Fitting, the F.1236, is very reasonably priced. One of a family of fittings with interchangeable diffusers of varying designs, it is especially suitable for schools, offices and hospitals—wherever economy of installation is essential, as well as good appearance and sturdy construction.

Mazda

Fluorescent lamps stay brighter longer

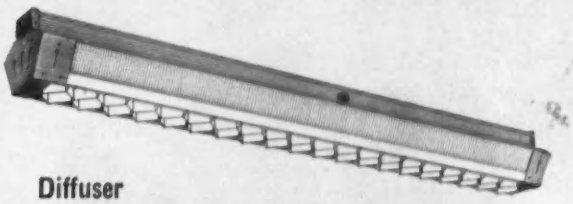
THE BRITISH THOMSON-HOUSTON CO. LTD.
Crown House, Aldwych, London, W.C.2
(Member of the A.E.I. Group of Companies)

B T-H

M4578

The Mazda F.1236 Diffuser Fitting

for more economical installation



Diffuser

Design provides simple lift-and-engage attachment to channel, without removing the lamps.

Metal honeycomb louvers

finished in hard gloss enamel with two side panels of translucent 'Perspex'.

Easier maintenance

Diffuser releases from either side and hangs clear of lamps, leaving them readily accessible for maintenance.

Switch-start or Instant-start

BTH Lamp Auxiliary Gear ready wired for either one or two 80-watt fluorescent lamps. BTH fixed lamp holders with retractable lamp shields as standard equipment.

Leaflet DL9630-6 gives details

MINERVA ELECTRICAL INSULATING VARNISHES LACQUERS, ENAMELS & COMPOUNDS

REGISTERED TRADE MARK

STOVING VARNISHES (Natural Resin Type)
STOVING VARNISHES (Synthetic Resin Type)
THERMO-SETTING VARNISHES
AIR-DRYING VARNISHES
CLOTH VARNISHES
CORE-PLATE VARNISHES (Stoving and Air-Drying)
COPPER-WIRE ENAMELS (Oleo-Resinous and Synthetic Types)
All the above are supplied in black and clear.

ACID AND HEAT RESISTING ENAMELS (Available in all colours)
MICA BONDING VARNISHES
COIL STICKING VARNISHES
SLEEVING VARNISHES (Black, Clear and Colours)
CABLE LACQUERS (Non-Flam., Cellulose Type and P.V.C.)
COMPOUNDS (Various Types)
All the materials listed conform to B.S. Specifications wherever applicable.

As Insulating Varnish Specialists, our Research Laboratories have the most modern type of equipment. We invite you to consult our Technical Staff whose services are always at your disposal, on all matters relating to the use and application of our Minerva Insulating Varnishes, Lacquers, Enamels and Compounds.

PINCHIN, JOHNSON & CO.

4 CARLTON GARDENS, LONDON, S.W.1 Telephone: TRAfalgar 5600

(1) Operate a conveniently placed hand winch and the light comes down. (2) Service the light. (3) Winch the light back into position.

Briefly that is what L.E.F. Raising and Lowering Gear does and what could be a more obvious or simple method of maintaining out-of-reach lights? Apart from the convenience, the saving in time and labour is considerable.

L.E.F. gear has been used extensively in street and interior lighting systems all over the country. Once you have seen it in operation you will realise why. May we give you a demonstration or send you full particulars?

L·E·F

LONDON ELECTRIC FIRM LTD.
Brighton Road, South Croydon, Surrey
Telephone: Uplands 4871

Grelco LIMITED

MULTI-PLUG ADAPTORS

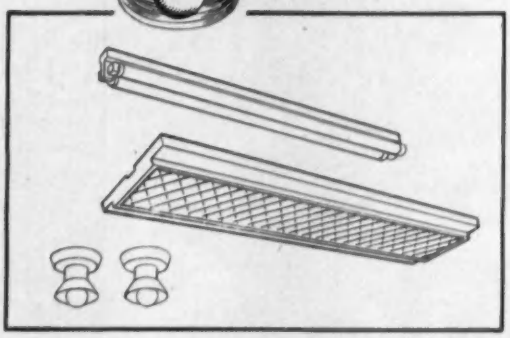
MINEHEAD SOMERSET *Telephone MINEHEAD 740*

Instruction Chart
For dealing with apparent death from
ELECTRIC SHOCK
based on the
HOLGER NIELSEN METHOD
On card size 19½" × 12" with special high quality finish, eyeletted and corded. Price 2/6 plus postage.

The ELECTRICAL TIMES Ltd
Sardinia House · Sardinia Street · London W.C.2

PHILIPS *"Gear-less"* LIGHTING

AMAZING LOW PRICE IS JUST ONE OF ITS SELLING POINTS!



Have a quick look at these point-by-point advantages:

- Fluorescent lamp and filament lamp can be fitted separately or together, as desired.
- Very light in weight.
- Absolutely noiseless in operation.
- With Deluxe Warm White lamp, gives perfect colour rendering for food display.
- Light output equal to two 100 watt filament lamps for only 115 watts.

And, of course, there's no control gear or starter switch required — hence the *considerable saving in weight and cost.*

Separate tungsten lamps, yet part of the same Philips "Gear-less" units. The tungsten ballast lamps take the place of P.F. capacitors, chokes and starters.

. . . with "GEAR-LESS" FLUORESCENT LIGHTING *from* PHILIPS

PHILIPS ELECTRICAL LTD., LIGHTING DIVISION, CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON, W.C.2.

TUNGSTEN, FLUORESCENT, BLENDED AND DISCHARGE LAMPS · LIGHTING EQUIPMENT · RADIO AND TELEVISION RECEIVERS · ETC.

(LD835)

THE HEART OF INDUSTRIAL EFFICIENCY

At the heart of modern power stations and up-to-date factories you will find

MITCHELL BOILERS

giving impressively reliable service.

High efficiency, low maintenance needs and keen prices ensure a steadily increasing demand for

MITCHELL INSTALLATIONS

in new industrial building programmes.

Although many Mitchell boilers are specially designed for specific loads, the standard range covers all normal steam-producing needs.

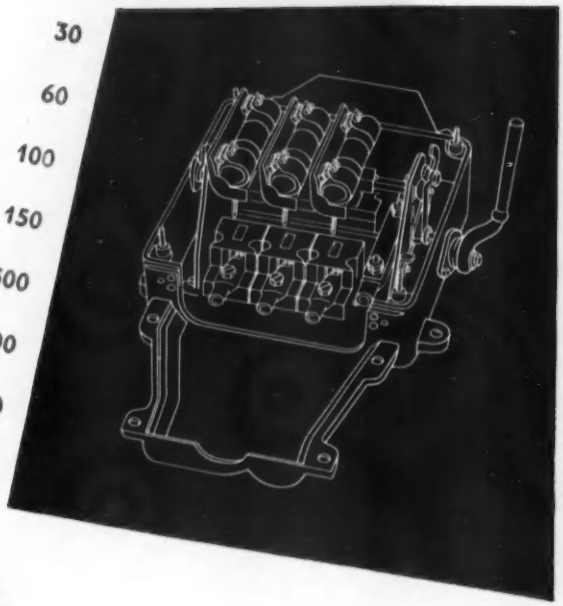
MITCHELL

WRITE TO MITCHELL ENGINEERING LIMITED, 1 BEDFORD SQUARE, LONDON, WC1

1403

Printed in England by Staples Printers Limited at their Great Titchfield Street, London, establishment, for the Proprietors, The Electrical Times Ltd., and published at Sardinia House, Sardinia Street, London, W.C.2.

30
60
100
150
300
400
600
AMP.



FUSE SWITCHES

25 MVA · 440 AC4

A range to meet a very wide variety of potential needs and established as giving mechanical refinements in keeping with the pronounced electrical protection characteristics of Aeroflex rewireable cartridge fuses.

Chassis-type construction, fully shrouded live parts, watertight cover joints and spindle gland combine with double isolation and parallel withdrawal to give the ideal Fuse Switch.

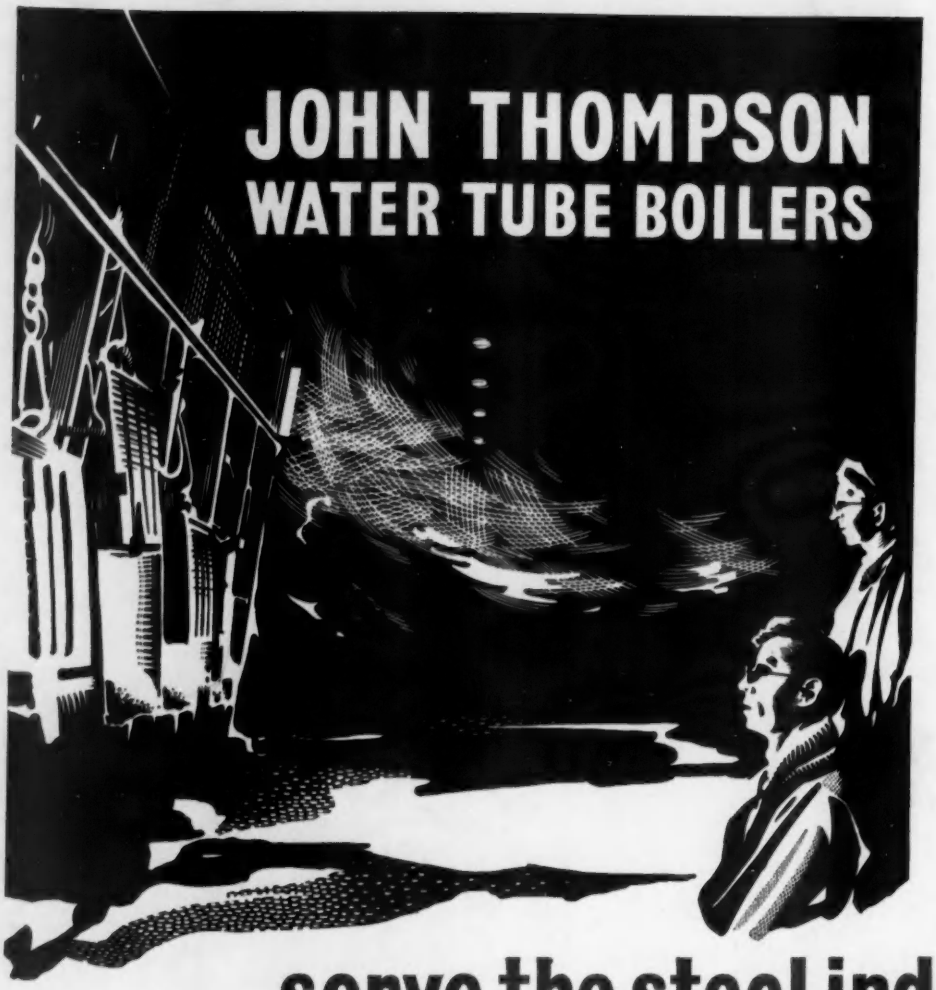
Fully described and illustrated in publication No. FSI

London: 34 Victoria Street, S.W.1
Glasgow: 5 Somerset Place, C.3
Birmingham: 38/41 Carrs Lane, 4

Aeroflex
HOPE'S PATENTS

PARMITER HOPE & SUGDEN LIMITED, MANCHESTER 12

dm PH91



serve the steel industry

2,500,000 lb.
STEAM PER HOUR

The recent boilers listed at the right comprise a total evaporative capacity of 1,604,300 lb. of steam per hour. With water tube boilers previously installed, the steelworks of this country now generate no less than 2,500,000 lb. of steam per hour from **John Thompson Boilers.**

The tremendous capital expansion in recent years in the Steel Industry has called for corresponding increases in boiler plant to serve these new extensions. It is significant that a very great number of these boilers have been John Thompson Water Tube Boilers:

Samuel Fox
1st Boiler ..... 25,000 lb. per hour
2nd Boiler ..... 25,000 lb. per hour
3rd Boiler ..... 25,000 lb. per hour

Dorman Long
1st Boiler ..... 100,000 lb. per hour
2nd Boiler ..... 100,000 lb. per hour
3rd Boiler ..... 100,000 lb. per hour
4th Boiler ..... 100,000 lb. per hour
5th Boiler ..... 100,000 lb. per hour

Steel Company of Wales
1st Boiler ..... 38,500 lb. per hour
2nd Boiler ..... 38,500 lb. per hour
3rd Boiler ..... 38,500 lb. per hour

Steel Company of Wales
1st Boiler ..... 10,000 lb. per hour
2nd Boiler ..... 10,000 lb. per hour
3rd Boiler ..... 10,000 lb. per hour

Steel Company of Wales
1st Boiler ..... 34,400 lb. per hour
2nd Boiler ..... 34,400 lb. per hour
3rd Boiler ..... 34,400 lb. per hour

John Summers
1st Boiler ..... 85,000 lb. per hour
2nd Boiler ..... 85,000 lb. per hour
3rd Boiler ..... 85,000 lb. per hour

Appleby-Frodingham
1st Boiler ..... 85,000 lb. per hour
2nd Boiler ..... 85,000 lb. per hour
3rd Boiler ..... 85,000 lb. per hour
4th Boiler ..... 85,000 lb. per hour
5th Boiler .....135,000 lb. per hour

Stewarts and Lloyds
1st Boiler ..... 50,000 lb. per hour
2nd Boiler ..... 50,000 lb. per hour

Steel Company of Wales
1st Boiler ..... 40,000 lb. per hour
2nd Boiler ..... 40,000 lb. per hour
3rd Boiler ..... 40,000 lb. per hour

JOHN THOMPSON WATER TUBE BOILERS LTD.
WOLVERHAMPTON

JOHN THOMPSON WATER TUBE BOILERS LIMITED · JOHN THOMPSON GROUP

WT/106